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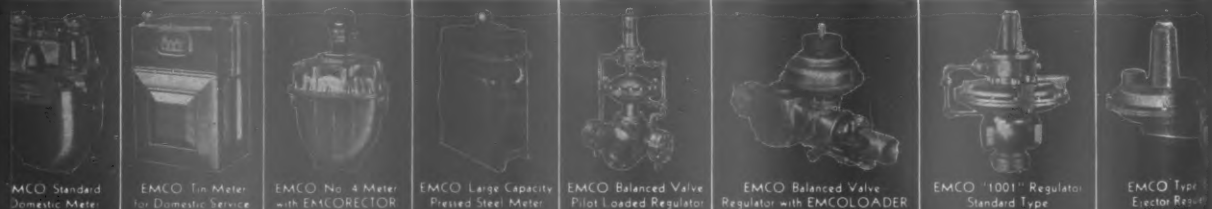

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Trends

Crude-Oil Production By States—Page 144

CRUDE-OIL STOCKS 223,597,000 bbl. as of August 12 up 666,000 bbl. One year ago 236,520,000 bbl.

GASOLINE STOCKS 81,203,000 bbl. as of August 12—up 402,000 bbl. One year ago 71,248,000 bbl.

RESIDUAL FUEL-OIL STOCKS 57,003,000 bbl. as of August 12—up 431,000* bbl. One year ago 66,644,000 bbl.

GAS OIL AND DISTILLATE STOCKS 40,035,000 bbl. as of August 12—up 625,000 bbl. On year ago 34,768,000 bbl.

CRUDE-OIL PRODUCTION 4,678,450 bbl. as of August 19—up 22,350 bbl. One year ago 4,224,300 bbl.

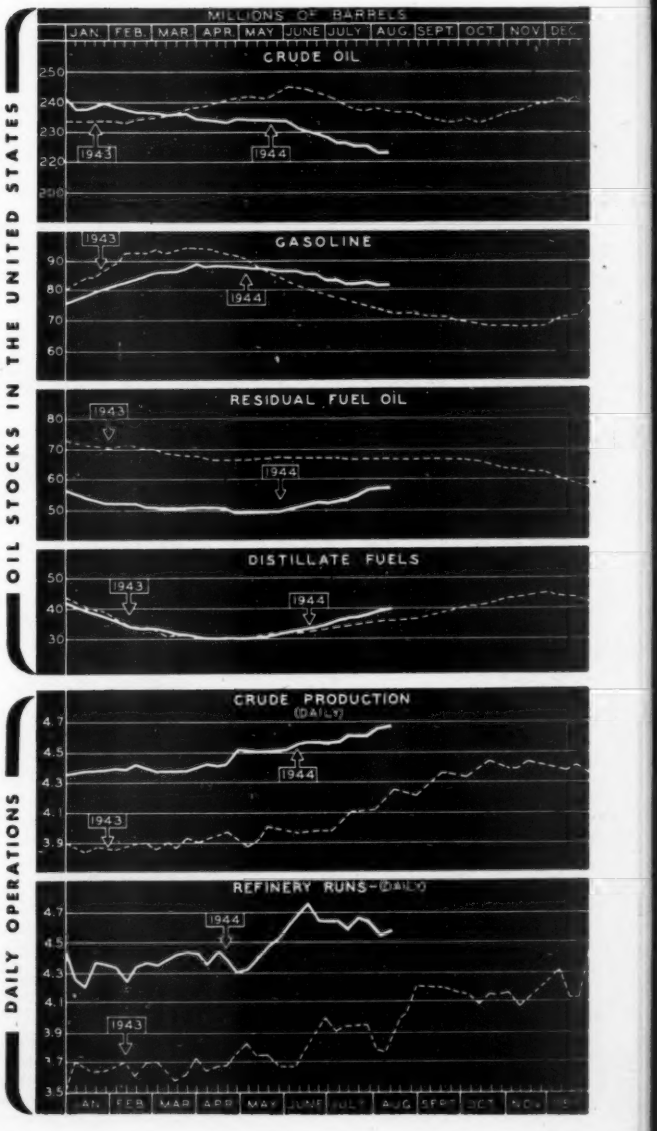
REFINERY RUNS 4,560,000 bbl. daily week ended August 12—up 31,000 bbl. Year ago 4,050,000 bbl.

*August 5 stocks revised.

OPERATORS in the producing, refining and transportation branches of the petroleum industry in projecting their activities over the rest of the year are confronted with two opposing conditions. From the Washington war administration is the program which calls for maximum operation of practically every facility which will add to the available output of petroleum products. For September this program calls for a domestic output of liquid petroleum products in excess of 5,000,000 bbl. daily, an increase of 105,000 bbl. daily over August.

AT the same time operators feel it is mandatory that they give consideration to the contraction in their record operations that will be necessary should the European phases of the war end during the fall months, a development which daily appears more probable due to Allied successes. As has been apparent from the published analyses of the past few weeks, there is no consensus as to the effect the capitulation of Germany will have on petroleum operations in the United States and other parts of the Western Hemisphere. According to one national authority this confusion will not end until it is known what policies will prevail in regard to the military and civilian uses of petroleum products after the war ends. In regard to the military demands, this observer doubts that much will be known about the Government's plans until after the German war ends.

IT is pointed out in this connection that the Allied military machine has tremendous quantities of all war products in storage in Europe and parts of Africa and in this country and Canada. These inventories, it is said, are sufficient to supply a large part of the European postwar needs for a considerable period, if that plan of disposal is adopted, resulting in immediate large reductions in new supplies from refineries in this hemisphere. It is assumed that part or all of the aviation gasoline inventories will be transferred to serve the Pacific war theater, thus also reducing the new shipments required from the aviation-gasoline plants in this country. Another analysis stresses the importance of the Government's program in regard to civilian gasoline rationing at the conclusion of the European war as being a controlling factor in projecting the immediate postwar operations.



Texas Seeks Abolishment of Unnecessary PAW Regulations

AUSTIN.—Reply was awaited this week to the Texas Railroad Commission's urgent appeal for a definite statement of policy on liquidation of the Petroleum Administration for War. Beauford H. Jester, chairman of the commission, last week addressed a letter to Petroleum Administrator Harold L. Ickes at Washington pointing out the desirability of reaching definite decisions on how and when regulation of the industry will be returned to the producing states.

Jester urged Secretary Ickes to make a prompt reply to his letter or to schedule a conference with members of the commission early in September at which problems of converting from centralized-federal control to state regulation would be discussed.

Meanwhile, Jester, Olin Culberson and Ernest O. Thompson, the commissioners, asked Texas operators to advise them promptly as to which PAW regulations and requirements could be and should be abolished without interfering with necessary industry coordination for the duration.

Jester's letter to Ickes requesting a statement of policy or a conference in September follows:

Dear Mr. Administrator:

As chairman of the Railroad Commission of Texas, I wish to respectively bring to your attention (1) the desire and intention of this commission immediately upon the termination of the war to resume the entire regulation and conservation of oil and gas in Texas under the laws and statutory authority given it by the State of Texas, and (2) our willingness to cooperate with you as administrator of the Petroleum Administration for War to liquidate the Petroleum Administration for War and assist in the relinquishment of its administrative regulation and control of oil and gas and the oil and gas industries in Texas and the other oil-producing states after the war.

It is respectively submitted that it is now proper and timely to announce the plan and processes which the Petroleum Administration for War will follow in returning the regulation of oil and gas to the oil-producing states. Only last Friday the Senate of the United States passed the Reconversion Act. It is now being considered by the House of Representatives.

Since Deputy Administrator Ralph K. Davies on June 15 assured representatives of the oil industry meeting in Houston that the Petroleum Administration for War was only a war agency and would not last beyond the war, it seems highly advisable that the plans to terminate and end its administrative authority and control when the war emergency ends should be announced or formulated at the earliest date.

If the plans for the termination of the Petroleum Administration for War and its regulatory control have been made, the Railroad Commission of Texas would greatly appreciate being advised of these plans.

If plans for liquidation of the Petroleum Administration for War at the end of the war have not been formulated, this commission tenders its assistance to your office in and for the immediate formulation of these plans. The members of this commission would be most agreeable to meeting with you and your staff for this purpose if our cooperation is desired.

Conservation of oil and gas is properly a function and duty of the states. Texas has long recognized this. You are no doubt aware that because of the oil conservation statutes of Texas and their enforcement by this commission by conservation orders and rules, Texas oil was available and has been the most potent factor in the oil production which the United States had to have to meet military and civilian needs during the war.

The heavy war demand upon the oil fields of Texas has not only reduced and depleted the oil in these reservoirs and reservoir pressures, but in many fields has necessitated their being produced above their maximum efficient rate of production. This was willingly and promptly done, however, in order to meet the heavy increasing requests for Texas oil which your office is certifying each month.

This commission is studying plans to meet the changed conditions in the oil and gas industry after the war, when the military needs for oil will be sharply reduced. Texas and other oil-producing states will have many conservation problems to meet. We want to be ready immediately to start work on conservation and adding to our depleted reserves by exercising our regulatory rights to that end. We do not want our administration and handling of these problems to be delayed or impaired by any question about or dispute with any federal agency as to our full and complete right and authority to do these things free of federal control.

If there are to be any requirements made of the State of Texas or the other oil-producing states by the Petroleum Administration for War or any other federal agency before it relinquishes and returns full regulation and control of the oil and gas to the states, these requirements should be made known immediately in order that they may be studied, appraised, and satisfied before or by the end of the war.

I would greatly appreciate an early reply to this letter. I would even more appreciate a conference with you early in September relating to the subject matter of this letter.

This commission would also like to propose and discuss with your office the early relinquishment of certain of the Petroleum Administration for War regulations which would be of great aid to the industry and to the state regulatory bodies and would not impair the war job your administration is performing.

Assuring you of my willingness to bring and submit to you any data that you would like to have from the Railroad Commission of Texas that would be helpful to you, and with kindest regards, I am

BEAUFORD H. JESTER,
Chairman, Railroad Commission of Texas.

Producers Advised to Check State Classification of Subsidy Pools

WASHINGTON. — Producers were given additional instructions this week by the Office of Price Administration on how to qualify for subsidy payments under regulations issued by the Defense Supplies Corp. to purchasing companies.

Crude-oil producers generally were informed that on pools that do not qualify for inclusion in the plan on the basis of December 1943, production and well data, or on pools for which they wish to apply for a change of premium, they must submit the following data for the 12-month period preceding the date of application: The number of producing oil wells in each pool on the last day of each month in this 12-month period, and total production of crude oil in the pool during this 12-month period.

Producers were reminded that pools are deemed qualified for the premium payments on the basis of information supplied by state conservation authorities and that inclusion of pools in the plan depends upon proper certification of the facts. Where there is question concerning the geographical limits of pools for which premium payments have been authorized, the geological definitions of pools, horizons or zones, and the identification of pools from which individual wells produce, producers should obtain certification of the facts from the state conservation authorities.

Another OPA announcement applied only to purchasers of crude oil produced in Kansas and Oklahoma. These purchasers, who are generally refiners, are asked to assist OPA in determining whether specific dollar-and-cent ceiling prices should be established for crude oil of practically all the degrees of gravity produced in these two states. The purpose would be to enable such producers as are selling under their maximum prices to receive the full premiums, and at the same time to enable purchasers of

this oil to be reimbursed fully for the premium price increases.

The Kansas and Oklahoma crude-oil purchasers are asked to send OPA at the earliest convenient time the following data:

1. The following information for the month of June 1944: (1) Total purchases of crude oil in Kansas and Oklahoma; (2) total barrels of crude oil between 21° and 29° gravity purchased in those states; (3) total barrels of crude oil between 21° and 29° gravity purchased from the pools in Kansas and Oklahoma listed as entitled to payments under the stripper-well premium plan, and (4) the prices paid for all crude oil purchased in these two states.

2. Comment either for or against adoption of a proposed scale of specific dollar-and-cent ceiling prices for Kansas and Oklahoma crude oil. The scale would start at $1.25 per barrel for crude oil of 40° gravity and above, with 2 cents off for each degree of lower gravity, and would range down to 85 cents a barrel for 20° gravity. The 85-cent ceiling price would also apply to all gravities produced under 20°.

Currently, ceilings are established by taking the highest posted prices at a pool or area on October 1, 1941. This results in generally uniform ceilings for crude between 29° and 40° gravity at the same levels as the proposed spell-out scale. However, varied postings in the base period for oil under 29° gravity cause some companies to sell at prices lower than others, although actually they are entitled to sell at the highest base period price posted in the area. In other words, they are selling at their own schedules and under their legal maximum prices.

Under the stripper-well premium plan a problem has been created by this condition because full premiums will not be paid by Defense Supplies Corp. where purchasers are not paying the maximum price. In such cases the premiums are 35, 25, or 20 cents a barrel, as the case may be, less the difference between the purchaser's price and the legal maximum price.

79 Texas and Louisiana Fields Granted 10-Acre Well Spacing

WASHINGTON.—The size of drilling units for new oil wells in 79 fields in Texas and Louisiana has been reduced from 40 acres to 10 acres, Deputy Petroleum Administrator Ralph K. Davies announced last week.

This action was taken by the issuance of Supplementary Order 13 to Petroleum Administrative Order 11, which controls the use of critical materials in petroleum-production operations.

Under the new supplementary order an operator may drill a new oil well on a 10-acre unit, provided the unit is in the salt dome fields and fields of similar characteristics listed in the order.

The reworking, deepening, or recompletion of old wells into another pool in the specified fields may be carried out on a 10-acre pool spacing basis.

Davies pointed out that nothing in the supplementary order suspends applicable state regulations respecting the distance between wells and the distance of wells from property lines.

The new order will eliminate the necessity for filing a large number of applications for authority to drill on units of less than 40 acres, a condition that prevailed because of the complex geological conditions in the Texas and Louisiana fields, Davies said.

In fields in Texas and Louisiana that are not specifically listed in Exhibit 1 of Supplementary Order 13, the provisions of Supplementary Order 12 to PAO-11 will still apply, Davies explained. Fields listed in Exhibit 1 and the counties in which they are located, follow:

EXHIBIT 1

Texas. — Arriola, Hardin; Barbers Hill, Chambers; Batson, Hardin; Big Hill, Jefferson; Big Creek, Fort Bend; Blue Ridge, Fort Bend; Boling, Fort Bend and Wharton; Boggy Creek, Anderson and Cherokee; Brenham, Austin and Washington; Clay Creek, Washington; Clam Lake, Jefferson; Damon Mound, Brazoria; Danbury, Brazoria; Esperson, Liberty; Fannett, Jefferson; Goose Creek, Harris; Hankamer, Chambers and Liberty; High Island, Galveston; Hull, Liberty; Humble, Harris; Kitrell, Houston; Lost Lake, Liberty; Markham, Matagorda; Millican, Brazos; North Dayton, Liberty; Orange, Orange; Orchard, Fort Bend; Pierce Junction, Harris; Port Neches, Orange; Saratoga, Hardin; Sour Lake, Hardin; South Liberty, Liberty; Spindletop, Jefferson; Stratton Ridge, Brazoria; South Houston, Harris; West Columbia, Brazoria.

Louisiana. — Anse La Butte, St. Martin; Avery Island, Iberia; Bayou Blue, Iberville; Bayou Boullon, St. Martin; Bayou Des Glaises, Iberville; Bayou St. Elaine, Terrebonne; Black Bayou, Cameron; Caillou Island, Terrebonne; Cameron Meadows, Cameron; Chocahoula, La Fourche; Cheneyville, Rapides; Darrow, Ascension; Dog Lake, Terrebonne; East Hackberry, Cameron; Edgerly, Calcasieu; Fausse Point, Iberia; Four Isle, Terrebonne; Garden Island Bay, Plaquemines; Gueydan, Vermilion; Jefferson Island, Iberia; Jennings (Evangeline), Acadia; Lake Barre, Terrebonne; Lake Hermitage, Plaquemines; Lake Pelto, Terrebonne; Lake Washington, Plaquemines; Leeville, La Fourche; Napoleonville, Assumption; New Iberia, Iberia; Plumb Bob, St. Martin; Port Barre, St. Landry; Potash, Plaquemines; Pine Prairie, Evangeline; Starks, Calcasieu; Sulphur Mines, Calcasieu; Sorrento, Ascension; Valentine, La Fourche; Venice, Plaquemines; Vermilion Bay, Iberia; Vinton, Calcasieu; West Cote Blanche Bay, St. Mary; West Hackberry, Cameron; White Castle, Iberville; Wolsh, Jefferson Davis.

Tide Water Directed to Negotiate Contract

WASHINGTON. — The National War Labor Board August 18 unanimously supplemented a directive order of the Second Regional WLB at New York by directing the Tide Water Associated Oil Co. of Bayonne, N. J., and the Employes Association, Inc., unaffiliated union, to negotiate a separate collective bargaining agreement covering armed guards in accordance with the board's decision in the Brewster Aeronautical Corp. case.

The Regional Board had directed the exclusion of administrative employes and armed guards from the agreement covering production and maintenance employes, without reference to a separate agreement for the armed guards, who the union contends have been part of the bargaining unit for 22 years.

The union, representing 1,600 employes in the company's refinery at Bayonne, is negotiating its first contract, although it has been recognized by the company for more than 20 years.

CIO Certified in Two Oil Company Cases

WASHINGTON. — The National Labor Relations Board last week certified the Oil Workers International Union, CIO, as collective bargaining agent for production and gasoline department employes of Gulf Oil Corp., Seminole, Okla., following an election held June 27 and 28. The election was contested by the company, and referred to the NLRB, which overruled the objections.

The NLRB also certified the Oil Workers International Union, Local 227, CIO, as collective bargaining representative of production and maintenance employes at the Pasadena, Tex., plant of Crown Central Petroleum Corp. in a decision released August 15.

Civilian-Oil Stocks Decline 32 Per Cent in Past 3 Years

WASHINGTON. — A 32 per cent depreciation of the nation's inventory of essential civilian petroleum products over the past 3 years was reported here last week by the Petroleum Administration for War. Combined stocks of civilian-grade gasoline, heating oils, diesel fuel and industrial fuel oils on August 1 totaled 132,000,000 bbl., compared to a total of 194,000,000 bbl. for the same products August 1, 1941. Civilian gasoline stocks are only 63 per cent of the prewar level, heating oils are 88 per cent of the peacetime inventory and industrial fuel stocks are only 61 per cent of the August 1, 1941, stockpile.

The basic figures on civilian petroleum inventories disclosed last week by PAW were part of a new monthly supply bulletin inaugurated to show the industry and consumers where the nation stands with respect to oil stocks. The first report covers a 5-week period, from July 1 to August 5, and data reveal that deliveries of motor gasoline from refineries and terminals exceeded production by 92,500 bbl. daily. Deliveries totaled 1,330,200 bbl. daily while refinery production totaled 1,237,700 bbl. daily. Corresponding deliveries during the first half of 1944 averaged 1,243,100 bbl. daily, or 87,100 bbl. daily less than during the period July through August 5.

Civilian Production Declining

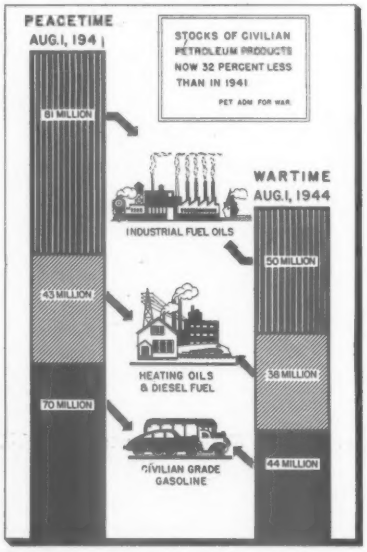
Refineries and natural-gasoline plants in the United States produced a daily average of 1,237,700 bbl. of civilian-grade motor gasoline during the period July 1 through August 5. This represents a decrease of 31,400 bbl. compared to the daily average of 1,269,100 bbl. reported for the first 6 months of 1944.

This reduction in refinery yields of civilian gasoline took place despite the fact that average daily crude-oil runs to stills during the last 5 weeks were 183,000 bbl. higher than the daily average during the first half of 1944.

Less civilian gasoline is manufactured because more and more of the crude oil is refined into 100-octane gasoline and other military products. The result is a reduced yield of civilian-grade gasoline from each barrel of crude oil. This reduction of civilian gasoline is now estimated to be three-fourths of a gallon less per barrel of crude oil than during the first half of 1944.

The total stocks of civilian-grade gasoline held at refineries and terminals in the United States totaled 43,036,000 bbl. on August 5. This is a decrease of 3,238,000 bbl. since July 1. Inventory declines were recorded in all districts. The largest inventory draft appeared in District 2 (Middle West) where a reduction of 1,719,000 bbl. was recorded.

The production and stocks of civilian-grade motor gasoline are shown in the accompanying table.



Relative position of civilian petroleum stocks in peacetime and now

PRODUCTION AND STOCKS OF GASOLINE BY DISTRICTS

	Refinery production (bbl. daily)		Stocks (bbl.)	
	Jan. through June	July to August 5	July 1	August 5
District 1 (East Coast)	189,800	177,600	7,831,000	7,646,000
District 2 (Middle West)	471,900	451,300	19,908,000	18,189,000
District 3 (Southwest)	405,500	410,700	12,503,000	11,998,000
District 4 (Rocky Mountain)	39,300	37,600	1,692,000	1,513,000
District 5 (Pacific Coast)	162,600	160,500	4,340,000	3,690,000
Total United States	1,269,100	1,237,700	46,274,000	43,036,000

Blasting of Enemy Oil Targets Continues

LONDON. — Shrinkage of desperately needed Axis petroleum supplies continued during the past week with the methodical blasting of enemy oil properties.

Flying Fortresses of the Fifteenth U. S. Air Force August 19, for the third consecutive day, bombed Ploesti, Romanian oil center. Royal Air Force heavy bombers pounded oil installations in Germany, France and Belgium. Objectives included the Sterkrade-Holten synthetic oil plant, sixth largest in the Ruhr, and oil-storage depots at Rieme, Belgium.

These raids were preceded by terrific drubbing of the German Baltic ports of Stettin and Kiel, which the Germans characterized as terror attacks, with the admission that "major damage was caused" in the oil center of Stettin.

The heavy bombers encountered unusually light fighter opposition at the widely separated ports. This was evidence of the effectiveness of the tremendous attack on airfields and parked planes in Western Germany and the low countries by nearly 2,000 American and British bombers 36 hours earlier.

Stettin is the chief Baltic port used by the Germans for supplying their troops in Finland and is on the upper flank of the Russian front. The city, with a prewar population of about 270,000, is the site of oil refineries and chemical industries.

Kiel, some 200 miles west of Stettin, is a naval base and ship-building center and has important full stores.

For the fourth straight day U. S. Eighth Air Force sent 1,000 or more Flying Fortresses and Liberators against continental objectives. Targets included synthetic oil plants at Zeitz, Bohlen and Madgeburg; a carbonization plant and oil refinery at Rositz; aircraft engine plants at Madgeburg, Dessau and Kothen. The synthetic oil plants had been put out of commission several months ago, but recently were repaired and were producing on a reduced scale.

American heavy bombers spread devastation August 19 at the oil-supply center of Ceram, in the Japanese-held Netherlands Indies. Big fires and explosions were touched off among the installations. Two fighter planes were lost in the raid.

A survey of the destruction inflicted on enemy oil properties during recent weeks discloses that the biggest refineries in Poland have been taken by the Russians, that the three big refineries at Vienna have been put out of business, and that Hungary's oil installations are receiving systematic bombing.

THIS WEEK

PRODUCTION—Quotas of 5,051,000 bbl. daily in September assigned oil states, highest in history, net increase of 105,000 bbl. a day above August. . . . Texas' assignment raised to 2,303,000 bbl. daily, up 66,000 bbl. . . . Chief increases allocated to sweet-crude pools. . . . East Texas cut 1 producing day, to arrest bottom-hole-pressure decline. . . . ¶Last week's crude-oil production of 4,678,450 bbl. daily establishes new record. . . . ¶PAW asks Atlantic Refining Co. to ship 41,000 bbl. daily of sour West Texas crude next month from Midland, half to West Coast, half to northern and eastern refineries. . . .

REFINING—PAW appeals for maximum production of 80-octane all-purpose military gasoline, without cutting 100-octane output. . . . Motorized ground forces demanding substantially larger quantities to maintain pace of advance in France. . . . ¶Petroleos Mexicanos announces acquisition of refinery materials for two new plants at Poza Rica and Atzcapotzalco. . . .

INTERNATIONAL—Vague phrases in American-British oil agreement prompts strong protest from J. Howard Pew. . . . ¶Senate committee considering whether ratification is necessary. . . . ¶Many top executives in industry agree with Pew, fear that loosely worded document will be used to rig production, prices, trade. . . .

SUPPLIES—Civilian products 32 per cent lower than on August 1, 1941. . . . Industrial fuel oil inventories suffer biggest decline, gasoline next and light fuels third. . . . ¶Fewer than 8,000,000 bbl. of gasoline in East Coast storage. . . . ¶Motor fuel diverted from comfortable storage areas to "dry spots" wherever they show up, mostly on East Coast. . . . ¶Transportation becoming increasingly difficult problem, because of truck-tire shortage, diversion of tank cars to Pacific Coast service. . . .

TRANSPORTATION—Eighty-mile crude-oil line from Elk Basin to Laurel and Billings, Mont., scheduled for completion this month. . . . ¶Stanolind's 232-mile 12-in. crude system from Elk Basin to Casper will be finished next month. . . . ¶Both lines will contribute to increasing Rocky Mountain crude-oil outlet, relieve supply situation in Middle West. . . .

DRILLING—July and August completions fall behind projected pace for second half of year, magnifying gap between PAW goals and actual performance. . . . ¶Active wells remain at peak levels but slow moves, inexperienced crews cut down average completions per rig. . . . ¶Seventy-nine Texas and Louisiana fields, mostly salt-dome areas, placed on 10-acre spacing pattern. . . .

REGULATION—Texas Railroad Commission renews fight to abolish unnecessary federal controls. . . . ¶Administrator Ickes asked for definite statement of policy on liquidation of PAW or for September conference with regulatory bodies. . . . ¶Texas producers invited to advise commission which PAW regulations could be eliminated without impairing war coordination. . . .

Mementos of the oil industry's birth 85 years ago rest permanently in the Drake Memorial Park museum. Fitting anniversary ceremonies will be broadcast from the park near Titusville, Pa., next Sunday. The Boyle collection of pioneer kerosene lamps along the left wall was donated to the museum by the family of Patrick C. Boyle, founder of The Oil and Gas Journal

Pew Excoriates Vague Phrases in American-British Oil Agreement

PHILADELPHIA.—A strong indictment of vague phraseology in the American-British petroleum agreement was lodged this week by J. Howard Pew, president of Sun Oil Co. In a letter to Sen. Tom Connally, Texas, chairman of the Senate foreign relations committee, Pew expressed grave fear that the document may be the first step in "a carefully laid plan for a superstate cartel covering the petroleum industry in all parts of the world for the postwar years."

Pew took issue with those who consider the agreement as a "meaningless noise" and told Senator Connally that the "vague language" makes the instrument as "innocuous or as vicious as its administrators desire to make it."

As chairman of the Senate foreign relations committee, Senator Connally was urged to work for clarification of the petroleum agreement, to determine what is meant by phrases which are subject to dual interpretation and to vigorously oppose all actions that would in any way permit control of the domestic industry by foreign governments.

Pew's letter to Senator Connally follows, in part:

Radical Changes Feared

"I am writing to you, as chairman of the Senate Foreign Relations Committee, because I am seriously disturbed over the possibility that the recently published Agreement on Petroleum between the United States and Great Britain may become the foundation stone for far-reaching and radical changes in the relationships of our Government to the petroleum industry.

"It is neither an easy nor a pleasant task to write this letter because what I have to say may be most unwelcome in certain quarters. But I feel compelled to do so in the interest of protecting the livelihood of the thousands of workers employed in my company and those other hundreds of thousands of petroleum workers who have contributed so much to winning the war, and as a contribution to the public welfare.

"My concern, in large part, grows out of the vagueness of the language of this agreement which already seems to have lulled many into complacency regarding its possible implications. I am conscious of the fact that, as someone has said, 'to be grandly vague is the shortest route to power; for a meaningless noise is that which divides us the least.'

"The language of this agreement is as innocuous or as vicious as its administrators desire to make it. Virtually every paragraph in this agreement contains a phrase which raises questions that to date remain unanswered.

"What is the meaning of the phrase 'fair prices'? What is meant by the use of the phrase in this agreement 'production equitably distributed among the various producing countries'? Does it contemplate the shutting down of oil wells in this country by governmental edict in order that oil wells in some remote part of the world might continue to produce their 'equitable' share of the oil needed to meet the estimated world demand? Is it contemplated that the exports in this country of finished petroleum products may be restricted in order that the 'sound economic advancement' of some other country may be encouraged? Does the agreement mean that at some future time the International Petroleum Commission may decide there is a surplus of oil in the world and that production in the United States should be restricted?

"Only those who negotiated this agreement know the answers to these questions. The remainder of us are completely in the dark. Yet under the vague language of this agreement all these things are possible should we have a government of men so inclined. Or, the phrases upon which these questions are based may be meaningless.

"I gather from the press today that you are inclined to take this latter view. But I am not yet ready to believe that this agreement is 'a meaningless noise.' On the contrary I see in it the possibility of a first step in what might be a carefully laid plan for a superstate cartel covering the petroleum industry in all parts of the world for the postwar years.

"I know I need not labor with you the evil nature of the cartel system. Originating in Europe as a device to assure the security and survival of decadent and inefficient industries and economies, the cartel system is the antithesis of our American competitive system. It is a primary reason for the backwardness of European industry compared with our own. This our people know, and for more than 50 years it has been American public policy to outlaw monopolies growing out of schemes for price-fixing and production control. Only during the brief life of the National Recovery Administration in the thirties have we markedly departed from this policy.

Cartels Stifle Competition

"Cartel arrangements, as has been demonstrated again and again, have as their purpose the stifling of competition. Their effect has been to destroy initiative; close the door of opportunity for new individual entrepreneurs and small business units; encourage inefficiency; raise prices and thus lower the standard of living. All these fruits of the cartel system result in the freezing of industrial progress to the detriment of workers, consumers and those with savings to invest. A cartel under the aegis of governments is no less reprehensible than a cartel entered into by individuals. Both are detrimental to the public welfare.

"It is generally recognized that the American petroleum industry has supplied the No. 1 essential ingredients for United Nations victory in this war. Had this industry in the past been a part of a cartel system it never would have developed the facilities and organization to make possible its present tremendous output of war products. This is well illustrated by the fact that over 90 per cent of all the oil resources in the world have been discovered and developed by Americans. Under a system which has given free rein to their initiative and resourcefulness, they have outstripped in the development of oil fields the nationals of countries where the cartel system appears to be in high favor.

"The petroleum industry in this country depends for its existence on the initiative and ingenuity of its independent producers. The freedom of these men to venture their savings in an effort to discover and develop new reservoirs of oil with the hope of consequent reward is responsible for the tremendous oil resources which we now have available. Subject this industry to cartel

Senate Continues Study

WASHINGTON.—Brecke n r i d g e Long, assistant secretary, and Charles B. Rayner, petroleum adviser to the Department of State, last week insisted at a closed hearing that the American-British petroleum agreement would not in any way involve production in the United States. The Senate is continuing study of the question of whether the agreement requires ratification as a treaty with a foreign government.

controls and its forward march will be halted. I think it may fairly be added that oil is the lifeblood of all our economic life, in peace as well as in war, and any destructive regulation of the oil industry would have repercussions affecting every industry and everyone in this nation.

"Consequently, I believe that any action of our Government which may be open even to the suspicion of entangling any part of our American economy in the coils of this cartel system merits the most searching inquiry and the most careful scrutiny by the people's representatives in Congress. When such possible action is buttressed upon an international agreement, compact, treaty, or call it what you desire, it seems to me that the United States Senate, and particularly its Committee on Foreign Affairs, has a grave responsibility to assure that the country thoroughly understands the course upon which we are embarking. For as you know, treaties once ratified become the supreme law of the land and actions taken pursuant thereto could well supersede our federal antitrust laws and state laws and policies.

Some Aspects Approved

"So far as this agreement goes toward eliminating national frictions through acceptance of the principles of the open door and equal opportunity in the acquisition of exploration and development rights in areas not now under concession and in giving assurances for mutual respect of all existing valid concession contracts and lawfully acquired rights, it is a step in the right direction. My misgivings do not grow out of those parts of the agreement.

"Articles 3 and 4 raise questions which I think should merit the careful attention of your committee and the Congress. Article 3 provides for the establishment of an International Petroleum Commission, upon which the two governments would have equal representation. The commission is charged with the duty of preparing long-term estimates of world demand for petroleum products; of suggesting the manner in which, over the long-term, this estimated demand may best be satisfied by 'production equitably distributed among the various producing countries' in accordance with a vague criterion enumerated in the Introductory Article; of recommending to both governments 'broad policies for adoption by operating companies with a view to effectuating programs' thus suggested; of making certain other analyses; and 'to make, from time to time, such additional reports and recommendations to the two governments as may be appropriate to carry out the purposes of this agreement.'

"Although three different provisions of this agreement are made contingent upon this term, 'the purposes of this agreement,' such purposes are in no place specifically declared, unless the five vague and innocuous paragraphs comprising the Introductory Article are to be taken as such a declaration of purpose.

"If this latter conjecture be correct then there is little limitation upon matters concerning the petroleum industry with which this commission is empowered to deal. The same logic applies in the absence of any specific declaration of purpose.

Government Force Apparent

"Passing now to Article 4, we find that the 'two governments hereby grant reciprocal assurances . . . that upon approval of the recommendations of the commission they will endeavor, in accordance with their respective constitutional procedures, to give effect to such approved recommendations.'

"All of this is against the background of a general declaration that the two governments will so direct their efforts with respect to petroleum resources that 'adequate supplies of petroleum shall be available in international trade to the nationals of all peaceable countries at fair prices and on a nondiscriminatory basis, and that 'the development of petroleum resources and the benefits received therefrom by the producing countries shall be such as to encourage the sound economic advancement of those countries.'

"In other words, this agreement lays down the groundwork for the regulation by the British and American governments of the production, refining and distribution of petroleum and petroleum products. Obviously some form of price fixing and production allocation is contemplated.

"The public has not yet been informed of the nature of the discussions which resulted in the formulation of this agreement. Nor do we know the intentions of the negotiators. But it is reasonable to assume that these negotiators, when they proposed the establishment of an International Petroleum Commission with the function of preparing long-term estimates of world demand for petroleum and suggesting the manner in which 'this estimated demand may best be satisfied by production equitably distributed among the various producing countries,' were not engaged in the writing of meaningless phrases.

'They must have had in mind the thought that such estimates and suggestions would result in recommendations to the respective governments which called for action; that such action would place certain restraints or obligations upon operating companies which they, in the natural course of their operations, would not otherwise fulfill (otherwise there would be no need for governmental action); and each government gives reciprocal assurances it will act, that is enact legislation, to give effect to such recommendations when approved.

"Such recommendations would deal with the question of 'fair prices.' What is a 'fair price' for petroleum products at any given time? If it is to be controlled by the age-old laws of supply and demand, there is no need for governmental action. Or is supply, which is to say production, to be allocated in order to maintain some 'fair price' determined by a group of government officials? Will the basis for a 'fair price' be the operations of high-cost

(Continued on page 80)

Acme Photo

Sen. Tom Connally, Assistant Secretary of State Breckenridge Long and Sen. Francis Maloney, chairman, Senate oil committee, discussing American-British oil agreement

Industry Asked to Produce Record of 5,051,000 Bbl. Daily

Texas Assigned 66,000 Bbl. of Net National Increase of 105,000 Bbl.

WASHINGTON. — A production rate of 5,051,000 bbl. daily of all petroleum liquids was certified last week to the various oil-producing states for September. Next month's production quotas represent a net increase of 105,000 bbl. daily over the rate certified for August and is the first time in the history of the industry that it has been asked to produce in excess of 5,000,000 bbl. daily.

Bulk of the increase was assigned to District 3 states which were asked to produce 2,931,400 bbl. daily next month. Texas' quota of 2,303,000 bbl. daily, including 140,000 bbl. of natural gasoline and condensate, is 66,000 bbl. per day above the August certification. The rate of production certified to the eastern states, PAW District 1, has been increased slightly — from 68,400 bbl. daily in August to 71,300 bbl. per day in September. Current production indicates a possible small increase in capacity.

Middle West states, PAW District 2, are expected to produce 976,400 bbl. daily in September, a net increase of 11,600 bbl. All of the increase is attributed to Kentucky and Oklahoma, where rapid development of recently discovered reserves has provided additional productive capacity.

The production rate certified for the Rocky Mountain states, PAW District 4, remains practically unchanged to conform with the capacity of available transportation facilities to move crude oil within and out of the area.

California's production rate is certified at 936,700 bbl. a day, 19,600 bbl. daily more than that for August. A small portion of this increase is attributable to new development well completions, but the greater share is to come from developed reserves even though this may exceed maximum efficient rate of production in some instances.

Commenting on the increased rates certified for California and Texas, Deputy Petroleum Administrator Ralph K. Davies said:

"The urgency of military requirements has made it necessary to certify, as a matter of war necessity, a rate of production for California and Texas during September which, in the technical opinion of the Petroleum Administration for War, may well result in exceeding the maximum efficient rates of production for some fields in those states.

"In view of the fact that military demands still are higher than had been previously expected and that domestic production has reached peak efficient levels, it is imperative that civilian consumption be maintained at the absolute minimum required to carry on essential civilian activities at maximum efficiency, for the petroleum requirements of the armed forces must, and shall be, met."

PRODUCTION RATES IN BARRELS PER DAY

	Sept. 1944		Aug. 1944	Sept. 1943
	Certified total pet. liquids	Est. natural gasoline and condensate	Certified total pet. liquids	Actual prod. total pet. liquids
District 1:				
New York	13,800	....	12,800	14,100
Pennsylvania	43,100	1,000	41,800	44,100
West Virgina	14,400	5,400	13,800	14,600
Total	71,300	6,400	68,400	72,800
District 2:				
Illinois	222,000	12,000	226,500	232,800
Indiana	14,000	.....	14,000	14,500
Kansas	279,700	5,700	278,300	288,200
Kentucky	27,700	27,00	25,500	27,400
Michigan	51,500	500	51,400	57,700
Nebraska	1,000	.....	1,000	1,600
Ohio	9,700	400	9,100	9,700
Oklahoma	370,800	26,800	359,000	361,900
Total	976,400	48,100	964,800	993,800
District 3:				
Arkansas	82,900	4,900	82,500	80,600
Louisiana	385,000	35,000	385,000	369,300
Mississippi	45,000	.....	40,000	49,000
New Mexico	115,500	5,500	115,500	116,600
Texas	2,303,000	140,000	2,237,000	1,959,100
Total	2,931,400	185,400	2,860,000	2,574,600
District 4:				
Colorado	8,000	.....	7,900	6,700
Montana	24,300	300	24,200	23,200
Wyoming	103,200	3,200	103,000	98,900
Total	135,500	3,500	135,100	128,800
District 5:				
California	936,700	51,700	917,100	827,200
Others	.....	.....	.....	100
Total United States	5,051,300	295,100	4,945,400	4,597,300

Refiners Get Simplified Formula for Prices

WASHINGTON. — Refiners in 11 midwestern states have received from Office of Price Administration a simplified formula for arriving at prices on tank-car and transport-truck sales of gasoline and kerosene delivered at destination.

The new pricing system, embodied in Amendment 15 to Maximum Price Regulation 88, recognizes the practice followed by the oil industry for many years of quoting prices on petroleum products f.o.b. at Oklahoma basing point and adding the rail freight charges to destination to establish a delivered price. Resellers' margins, which might be reduced in some areas by unqualified use of this formula, are to be safeguarded by special provisions, which also must conform to recognized trade practices of the oil industry.

Tanker Named After Indian Who Showed Whites Oil

LOS ANGELES.—Soubarissen, the Indian chief who introduced oil to white men 317 years ago, was honored at the Sausalito, Calif., yards of Marinship Corp. August 12, when a big Navy oil tanker bearing his name was launched.

The "Soubarissen" was christened by Mrs. Andrew F. Carter, wife of Rear Adm. Carter of the Army-Navy Petroleum Board. The launching ceremonies, officially inaugurating the 2-week observance of the eighty-fifth anniversary of the American petroleum industry, took place near great oil fields and refineries and commemorated the aboriginal petroleum administrator, Chief Soubarissen.

FOUNDED IN 1910

BY PATRICK C. BOYLE

The OIL AND GAS JOURNAL

A Timely Letter

THE letter of Chairman Jester of the Railroad Commission of Texas to Petroleum Administrator Ickes explaining that the commission desires to take back the regulation of oil and gas developments in that state as soon as the war ends and asking that the petroleum industry and the state conservation bodies be advised now regarding the plans to liquidate PAW controls is both timely and justified by conditions.

The present membership of the commission which has directed the steady expansion of oil production in Texas for more than a quarter century, and which is responsible for many of the conservation practices effective in all oil states, knows that there are problems in the offing, the solution of which is dependent on the release of the oil industry from federal restrictions. The commission feels that the relinquishment of these regulations should start immediately and the pattern for the final ending of emergency controls made known by Mr. Ickes at this time.

It is proper that Texas take the lead in bringing the attention of the Washington administration to these matters. The state is currently supplying 45 per cent of the domestic crude-oil production. Its fields have made available most of the large increase in output of the past year without which there could not have been a successful invasion in western Europe nor aggressive Allied warfare in the Pacific area.

To make these record supplies available it has been necessary to exceed the maximum efficient rate of production in some fields and to draw heavily on the known oil reserves of the entire state. The Texas commission realizes that this war contribution has created conservation problems which will require special handling. Furthermore, it is conceded that the conclusion of the European war in the near future will result in decreased petroleum demands for a time at least. Texas will absorb most of these reductions requiring adjustments which can best be made by the state's conservation organization.

Basically, of course, the future of oil operators everywhere is dependent upon what is done now and later in enabling the petroleum industry to resume its prewar operating practices. The close of the European war, which may be a matter of weeks, will end the need for most of the war's petroleum controls despite Washington statements to the contrary. The industry can readily supply the products required to bring success to the remaining war areas. There can be an easing in civilian rationing which will be helpful in adjusting oil operations to peacetime levels.

Furthermore, termination of the European conflict will nullify the explanation that strict federal regulation of the entire petroleum industry is necessary in order to allocate equitably the limited materials and equipment available. Manpower and other unusual conditions brought about by the emergency will improve. All of these changes add up to a return to normal operating conditions.

Finally, there is the controlling situation stressed by Chairman Jester in a letter to the Journal in which he states: "It is my opinion that the states are going to have to actively assert themselves if they regain their state regulatory rights from the federal agencies. These agencies have been exercising regulations which rightfully belong to the states and which the states exercised prior to the intense centralization of power and federal control that has grown up during the war and the years just preceding it."

Pew Excoriates Petroleum Pact

(Continued from page 77)

producers and refiners who have failed to keep abreast of technological developments and increased efficiency? Does this declaration for a 'fair price' contemplate the governmental imposition of both ceilings over and floors under petroleum prices?

"At the outset of this letter I recited several questions which occur from the readings of such phrases as the satisfaction of estimated demand 'by production equitably distributed among the various producing countries' and that 'the development of petroleum resources and the benefits received therefrom by the producing countries shall be such as to encourage the sound economic advancement of those countries.'

"The agreement in Article 3 makes the declaration that there are 'numerous problems of joint immediate interest to the two governments . . . which must be discussed and resolved on a cooperative interim basis if the general petroleum supply situation is not to deteriorate.' Aside from controversies which may arise over concessions in foreign lands, what are these problems? What is this threatened deterioration of the general petroleum supply situation? It cannot grow out of insufficient supplies, once the war ends. Does it have to do with the possibility of postwar surpluses and a procedure for undertaking to handle them?

"Final acceptance of this agreement by the United States undoubtedly would mean the establishment of a postwar federal regulatory agency for the petroleum industry in this country. The extent of the powers of such an agency, would depend upon the force which our Government would give to this agreement. Such powers might be so wide as to supersede in virtually all respects the current petroleum policies of the several states. This in effect would mean the wrecking of our present Interstate Oil Compact, which has worked quite well.

"It has been suggested that this agreement on petroleum is nothing more than an international application of our Interstate Oil Compact. That is simply not so. In at least two particulars this agreement is the very antithesis of the Interstate Oil Compact.

"In the first place, our Interstate Oil Compact has as its specifically declared purpose the conservation of oil or gas by the prevention of physical waste thereof from any cause. And the Interstate Oil Compact contains the following very specific and definite declaration:

'It is not the purpose of this compact to authorize the states joining herein to limit the production of oil or gas for the purpose of stabilizing or fixing the price thereof, or create or perpetuate monopoly, or to promote regimentation, but is limited to the purpose of conserving oil and gas and preventing the avoidable waste thereof within reasonable limitations.'

"There is, moreover, a vast difference between our Interstate Oil Compact and this proposed international oil compact. Under the former, the power of regulating production and other functions of the petroleum industry is lodged within the state governments, where it should be, if such a function is to be exercised at all. But under this international compact the power of regulating production, as far as the United States is concerned, would of necessity, be centralized in the federal Government, where under our Constitution and the American way it has no right to be, under any circumstances.

"Thus the entire system of state laws relating to oil production, refining and distribution, built up over the years, and the Interstate Oil Compact would be destroyed. The federal Government would have an absolute power to apportion, ration or restrict production and use of petroleum products within the scope of the international allocation scheme. Such action would require freezing the position of all existing units of the industry, shutting the door against newcomers and creating a government-sponsored monopoly. It would not be long under such a monopoly before the American petroleum industry would lose all initiative and commence to disintegrate.

"But, it may be suggested, the negotiators of this agreement had no such intentions in mind. It is possible they contemplated limiting whatever controls are necessary to effectuate the agreement to petroleum products moving in foreign trade, thus leaving the American industry free in so far as its domestic business is concerned. But there is not one specific provision in this agreement to indicate that such is the intended course of action. If that is the plan, then it certainly should be specifically written into the agreement.

"Of course it may be said that the effectuation of such possibilities as I have mentioned above would require subsequent legislation and appropriations by the Congress and that when such proposals are made it will be time enough to consider these broad questions. The point is not well taken. For to make agreements with other nations which we do not propose to live up to would bring upon our country the just charge of national perfidy. Such a course of action, obviously, would greatly contribute in the postwar years to international frictions and misunderstandings rather than allay them."

DEATHS

George S. Heyer, 52, Houston, president of General Crude Oil Co. since its organization in 1933, died August 14 while on vacation in Mexico City. Heyer graduated from University of Texas in 1914. He was a director of Guardian Trust Co. Before the formation of General Crude he was affiliated with its predecessor, Cranfill-Reynolds Co.

John M. Riley, 65, Tulsa oil-lease broker for 25 years, died in that city August 17. He was of Cherokee Indian descent, attended Bacone Indian University and graduated from Yale in 1904.

H. C. Speer, 54, oil and gas conservation officer of the Oklahoma Corporation Commission, died unexpectedly in Duncan, Okla., August 13. His home was in Seminole, Okla.

George M. Bell, 36, for 8 years an independent oil operator in Houston, and for the last 4 years associated with Phillips Petroleum Co. in that city, died August 11 in Shawnee, Okla., where he went 3 months ago on account of ill health.

M. N. Harvey, 49, oil-well drilling contractor and producer, died recently in Honolulu. Before the war, in which he was serving with the Seabees, he was doing contractor work out of Artesia, N. M. He was president of Gunn Production Co. His home was in Cross Plains, Tex.

Charles W. Catlin, 44, vice president of Chatham Oil Co. and treasurer of Bates-Reading Oil Corp., met instant death August 21 when he fell from a twelfth-floor window of his office in Tulsa.

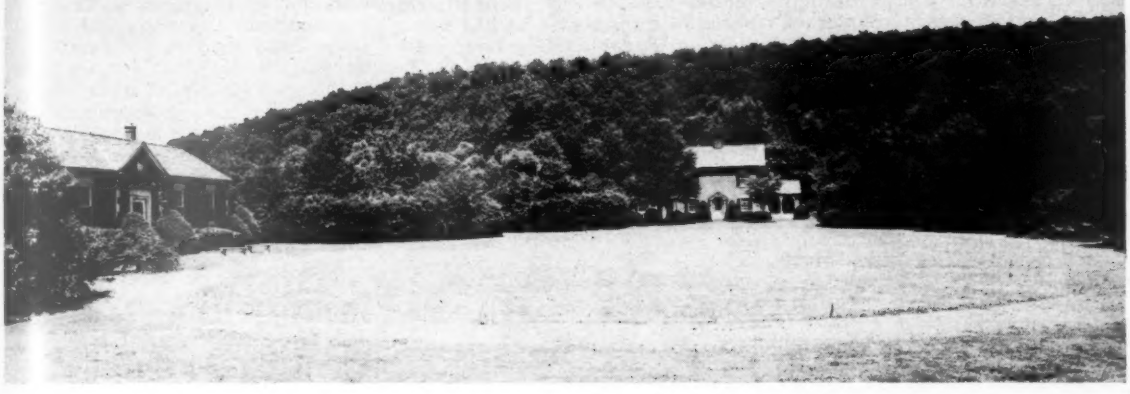
C. F. Speary, Marietta, Ohio, president of The Link Oil Co. of Tulsa, died August 21 in Union Memorial Hospital, Baltimore, following an operation. Speary was a pioneer oil and gas producer and operated extensively in Ohio and West Virginia before becoming interested in Oklahoma.

Frank C. Abbot, 54, Houston, tax agent for The Texas Co., died August 20. He had been in Texas service 25 years.

R. B. Melat, 73, veteran Texas oil operator, died in Wichita Falls August 20. He operated at Spindletop, Tampico, in California and in Texas Gulf fields. He was with Gulf Oil Corp. many years.

Eighty-Fifth Anniversary Finds Drake Memorial Rich in Oil Lore

by T. F. Smiley



Drake Museum to the left, caretaker's cottage in center, and Drake Monument to the right

TITUSVILLE, Pa.—Here at the site of the Drake well, where this whole thing began, they have set up a memorial that is something more than a rigid marble monument. It is not a tombstone, dolefully inscribed, "Here lies." It is a living institution, heralding, "Here it started—and it's still going strong."

It was 85 years ago — August 27, 1859 — that Uncle Billy Smith, who did the actual drilling, discerned oil rising in the 69½-ft. hole, drew Col. Edwin L. Drake's attention to it and jubilantly exclaimed, "That's your fortune coming!"

The petroleum industry had been born. A new era was on its way—an era which was to witness discoveries and inventions just as momentous, as dramatic, as the Drake well.

It has taken many years to put the happenings of that August day in their proper perspective. Uncle Billy was a true prophet when he declared that the greenish fluid upon which he and Drake turned their fascinated gaze was a precursor of wealth. Fortunes—thousands of them — were to be made; but Drake himself, the man whose initiative made the fortunes possible, was to die in poverty, a pensioner of the state, in 1880.

Movements designed to perpetuate Drake's memory and to preserve the site of his epochal well began early. They culminated in acquisition by the Commonwealth of Pennsylvania of some 200 acres of land along Oil Creek, in Crawford County, for use as a memorial park. The land, with a museum and library near the well site, is now in the hands of the Pennsylvania Historical Commission for operation.

The Drake museum and library are a treasurehouse. Priceless relics of the oil industry's primitive years are here, and the management has sought to supplement these with memorabilia significant of the pioneering spirit that has marked every stage of the industry's progress.

The late Ida M. Tarbell expressed the feeling that has guided the Historical Commission when she said, in 1934, that the museum and library "should be made a living center, a place where the documents of the history and growth of this our most typical American industry should be housed and kept growing, for students as well as for visitors."

Drake Well Memorial Park, spread in the beautiful Oil Creek Valley, with forest-covered hills rising on each side, conveys the impression of a great outdoor amphitheater. The museum, a one-story colonial brick-and-stone structure, is furnished with steel cases for preserving records and souvenirs. At one end of the building is the library room, with its steel shelving for books and newspaper files.

The E. C. Bell collection of newspapers, oil maps, oil books, early oil leases, account books of oil companies, directories of oil-region towns — a collection unequaled by any other of its kind in the world—is here. It formed the nucleus of a treasury already declared to be matchless in point of historic interest in the field of petroleum.

Here are 3,274 negatives left by

MUSEUM SEEKING HISTORICAL OIL MATERIAL

American Petroleum Institute in 1934 established Drake Well Memorial Park, with a museum and library, to mark the birthplace of the oil industry, and on August 27 of that year turned the property over to the Commonwealth of Pennsylvania for maintenance and operation. Since then the museum and library have acquired rich historical material—books, maps, newspapers, photographs, personal letters, diaries, oil-well tools, etc. Today this is the finest and largest collection of petroleum memorabilia in the country. It is desired to continue enlarging the collection. On the eighty-fifth anniversary of the oil industry the Pennsylvania Historical Commission is urging all persons who have historical material of any sort relating to the industry to communicate with Paul H. Giddens, curator, Drake Well Memorial Park, Titusville.

John A. Mather, pioneer oil photographer—2,229 identified and labeled, and the rest waiting to be identified. These contemporary scenes caught by Mather's camera possess the same thrilling relationship to petroleum's embryonic years that the famous Brady photographs bear to the Civil War.

Drilling tools of the Drake period stir wondering comment. They do look pretty crude of course, but they were revolutionary in their time.

The chronicles of early "oil-finding" devices provide a chapter of petroleum history that has its amusing side. A common supposition was that oil existed in big underground lakes. Just the same, in this day when the search for petroleum has become a highly specialized science it is a bit disconcerting to read in the Drake museum records that some important wells were drilled under the guidance of a spiritistic "control" or after gravely watching the antics of a forked stick.

"Dry Stake, Dry Hole"

Poring over material carefully preserved at the museum library you discover that among theories which once had a highly respectable following was one that required use of a green stake, cut from a living tree, to mark the location of a new well. A dry stake would be the sure forerunner of a failure. "Dry stake, dry hole; green stake, wet hole," went the oil-field adage.

How inventiveness met a new industry's multiplying problems is chronicled here. Among the stories of how we got it the one about Jim Cummings and his bulldozer ranks high. In 1923 Jim was a farmboy near Morrowville, Kans. Workmen were laying the 12-in. pipe line from Teapot Dome, Wyo., to Freeman, Mo. It crossed the Cummings farm. Jim watched Mexicans, with horses, laboriously fill the ditch. An idea seized him. He had a Fordson tractor, and in his mind's eye he saw it fitted with a pushboard. He unfolded his idea to the superintendent.

"Big companies have spent thousands of dollars trying to make something of that sort," replied the superintendent, adding with finality, "but none of them ever worked."

"If I make one will you give me a job?" persisted Jim.

"Oh, sure," returned the superintendent indulgently.

For 3 days and most of 3 nights Jim worked feverishly in the farm blacksmith shop with some old Model T car frames and the Fordson. There was no steel for a blade, so Jim fashioned one out of a stout plank. When his astonishing creation creaked and clanked out to the ditch an open-mouthed crowd gathered. Some hid their amusement. Some laughed in derision. For a half hour the strange contraption did a good job. Then the wooden blade hit a stump and splintered.

"Gimme time to make one with a steel blade and it'll work," pleaded the young inventor.

"Better go back to farming," was the response. "But if you want to try again, go ahead."

He did want to. He came back later driving his Fordson equipped with a steel blade. It performed so well that he ran night and day till he had made enough money to buy another Fordson—and another steel blade. In a short time he had seven units on the job, and he filled most of the line from Deshler, Neb., to Freeman, Mo. When the time came to get a patent Jim called his invention a "bulldozer." And that was the beginning of the monster which today not only plays an immense role in excavating and refilling work, but is being used in the Allied invasion of France to topple obstacles as if they were playthings.

Among the relics is the old safe in which John Benninghoff, suddenly rich through discovery of oil on his farm near Petroleum Center, Pa., stored almost a half million dollars because he didn't trust banks. One January night in 1868 robbers entered his home, bound the inmates, indulged in a snack of pie and milk and then rode off with $210,000. They overlooked $200,000 wrapped in brown paper. Jim Saeger, of Saegertown, Pa., handsome and popular, disappeared from his usual haunts. Three men, convicted of complicity in the robbery, served short prison sentences.

Three years later a western cattle king entered a saloon in Denver, Colo., and he was recognized as Jim Saeger by the bartender, who earlier had lived near Saegertown. The bartender telegraphed his discovery to Titusville. Chief of Police Rouse, of that city, and Joseph Benninghoff, a son of the man robbed, started at once for Denver.

Saeger was arrested. "You'll be a hell of a sight older before you see me in Pennsylvania," he warned his captors. A small army of Saeger's cowboys — reckless, lawless fellows — were in the city. Rouse and Benninghoff discreetly returned home without their man. Saeger lived for years after that, a prosperous cattleman in Texas.

Browsing among the records here you discover that petroleum's early history was not all stress and strain. There was time for fun, too. For instance:

Members of the old Oil City Oil Exchange, living in an atmosphere of excitement, were always ready to take or perpetrate a joke. A favorite prank was one played on any stranger who appeared on the floor wearing a "plug hat," as the tall silk headgear of the time was called. The visitor, commonly the guest of some member, would be introduced to a few men when suddenly his treasured top hat was snatched from his head. An instant later he was outraged at seeing a howling mob of brokers kicking a silk hat around the room, jumping on it and subjecting it to various indignities until it bore no resemblance to the elegant thing it had been.

The victim sometimes gave vent to his wrath in blistering maledictions. At this point one of the conspirators would appear in front of him and with a low bow and a gracious smile hand him his hat, undamaged. As the truth dawned upon him he usually invited the crowd to go out and "have something on him." The battered headpiece was just one of a collection of discarded "plugs" kept for this special purpose.

Memories. Stirring annals of yesterday's achievements. Pledge of greater accomplishments tomorrow.

Industry Receives Wide Publicity on Birthday

OBSERVANCE of the eighty-fifth anniversary of the Drake well began August 12 at Sausalito, Calif., with the launching of the tanker Soubarissen. Rear Adm. A. F. Carter, senior Navy member of the Army-Navy Petroleum Board, sponsored the ceremonies, and Mrs. Carter christened the ship, named for an Indian chief credited with showing the white man surface deposits of oil in Lake Erie district.

Every oil company with a radio program drew attention to the Drake anniversary. The Gulf Oil Corp.'s program, "We the People," will be broadcast directly from Titusville, Pa., site of the historic well, on Sunday, August 27. The Associated Press sent a picture page, "85 Years of Petroleum," to 1,200 newspapers, with a story of petroleum.

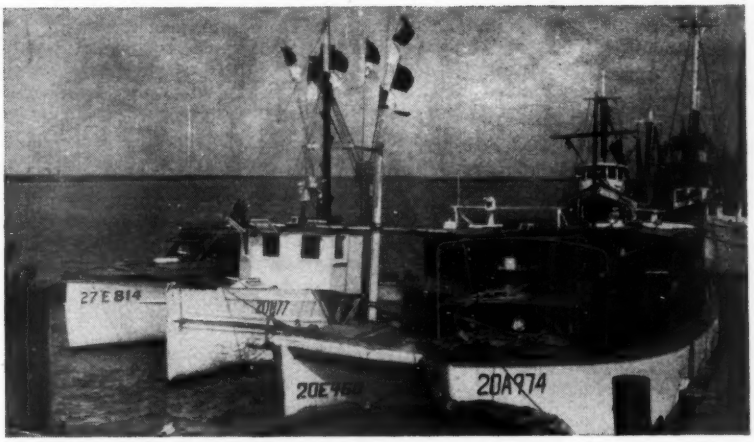
Oil companies, oil trade associations and organizations allied with the industry have devoted advertising space throughout August to recognition of the anniversary. The American Petroleum Institute's July "Quarterly" outlined the history of petroleum, and the Institute's information department aided in preparing special articles for newspapers, magazines and house organs.

The Navy provided by short-wave transcription brief statements of top-flight naval officers around the world on the vital importance of petroleum in their operations. The Army service forces prepared a program over a nation-wide network for August 25, paying tribute to the beginnings of petroleum's 85 years of progress. The Maritime Commission will christen the freighter Benjamin Silliman in September.

Distant Offshore Seismic Survey Conducted in Gulf of Mexico

by E. H. Short, Jr.

Geophysical operations in unprotected water beds at depths up to 45 ft. and far out of sight of land markers involve many problems not encountered in shore and close-in exploration. Some of these problems and methods being followed by Superior Oil Co. in carrying on this work are described in this article. A fleet of specially designed and equipped boats is required. Crew members perform with perfect coordination of efforts and efficiency despite handicaps.



In the foreground are four of the five boats in the Superior Oil Co. seismograph fleet in dock at Cameron, La.

DURING the past few months Superior Oil Co. has successfully extended the frontier of workable seismograph territory in open waters of the Gulf to a distance 26 miles offshore.

The seismograph and other types of geophysical instruments have been used extensively for the past 10 or 15 years in marsh lands and inland bays. With the discovery of prolific reserves in these areas it became more evident that potential possibilities for production might exist under the open waters of the Gulf itself. Considerable geophysical work was begun and carried out in 1932 close to the shore line which ultimately led to the development of offshore production.

The Creole field established production about a mile from the shore line of Cameron Parish, Louisiana, in 1938. And in 1941 a Miocene well was completed approximately 1¾ miles off the shore from Jefferson County. The early geophysical work in the Gulf of Mexico, however, did not extend beyond approximately 3 miles from the shore.

Thus, while it has been duly recognized that the oil prospects might possibly justify distant offshore seismic work, until such work was recently undertaken by Superior, no company seemed disposed to tackle the many problems (which could be quite easily anticipated) connected with such a survey.

Under the direction of K. G. McCann, chief geophysicist for Superior, seismograph troop No. 7 was formed for conducting distant offshore seismic work, and a fleet of boats was assembled which would enable the party to work in fairly rough water.

Fig. 1: Area in Gulf of Mexico south of Cameron, La., now being worked by Superior's geophysical party

The marine equipment necessary for carrying out seismograph work at comparatively great distances offshore consists of seven boats. The recording boat which carries the seismograph equipment is a 42-ft. cabin cruiser with a 12½-ft. beam. This boat is powered by a 130-hp. gasoline motor. There are two 40-ft. shooting boats each having a 12½-ft. beam. One of these boats is powered by a 110-hp. motor, and the other by a 60-hp. motor. The survey boat is a 37-ft. cabin cruiser with a 12½-ft. beam, powered by two 110-hp. engines. The backsight boat is also 40 ft. in length, with a 12½-ft. beam and is powered by a 60-hp. motor. A small 16-ft. craft is used as a utility boat and for recovering the geophones. Also assigned to the seismograph fleet is a Gar-Wood Overniter with a maximum speed of 45 m.p.h. which acts as an emergency boat, since it is capable of making quick trips to Lake Charles. This boat has twin-screw propellers.

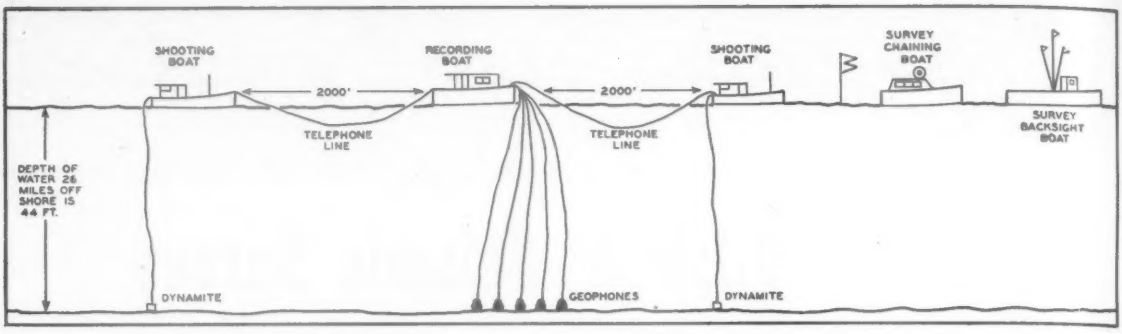


Fig. 2: Diagrammatic sketch showing typical spreads used in distant offshore seismic survey

R. E. Wilder, a veteran of coastal and inland water seismic work, is party chief, and key men in the party, under Wilder are F. E. Acord, troop leader; J. S. Rhodes, observer, and John French, surveyor.

Seismic shooting in the open gulf out of sight of land, and on water which is usually rough adds a bit of color to the work which the whole crew seems to like. Naturally the men selected for the work are expert swimmers. Work of this kind requires men of excellent physique, since the operations which include the setting and recovering of geophones, laying of communication lines and setting dynamite charges requires considerable physical stamina. Then, too, the work must frequently be performed in rough water, so that attention must be divided between maintaining firm footing while performing strenuous work.

Protection Against Squalls

In operations of this kind, at such great distances from the shore, the hazard of sudden squalls is always present. While the boats in the seismograph fleet are sturdily built, there is a limit to the squall intensity that they may safely withstand. If the boats were large enough to weather without damage the extremely severe blows which sometimes suddenly stir up huge waves, they would lack the maneuverability necessary for making seismic surveys on water. During distant offshore work, a close watch is maintained for sudden squall possibilities so that the fleet can make a dash toward shore.

The area worked by Superior south of Cameron, La., is shown in Fig. 1. The profiles were started from shore and projected out into the gulf approximately as shown. On land, or even shallow inland bays, the profile survey is a comparatively simple matter. In open gulf water, however, it becomes a rather involved problem. As "Red" McCann, chief geophysicist, put it, "when you're carrying a profile out to an ultimate distance of 26 miles into the Gulf, you can't take a reading on a tree at the close of the day's work to guide your survey for the following day." The curvature of the earth from a given point amounts to 0.7 ft. for the first mile and increases downward from the line of sight as the miles squared increases. At 4 miles, for example, the surface of the water would be 11.2 ft. below the line-of-sight tangent.

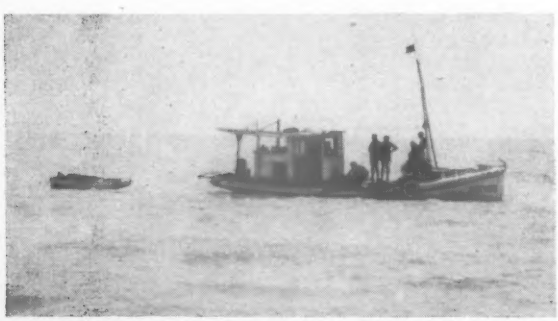
With no more elevation than provided by the survey cruiser, the shore line fades from sight early during the running of a profile. Therefore, one of the most important problems which confronted the geophysical department was that of designing adequate buoys. Any appreciable overnight shifting of the markers due to the action of waves would cause a serious loss of time if the profiles had to be reshot at frequent intervals. Satisfactory buoys were worked out which were responsible for a high degree of survey efficiency. As an example of the survey accuracy obtained, the triangulation of points approximately 10 miles out was found to be correct to within 100 ft. Considering the many factors involved in this type of survey, such as movement of boats, slight shifting of buoys, etc., this is considered as nearly perfect as it would be reasonable to expect.

In inland bays, and for a short distance out into the gulf, stakes can be used during the survey of profiles. But in deep water, which reached a maximum depth of 44 ft. in distant offshore stations, such a procedure is impossible. Considerable ingenuity was required to design floating backsights which would stand up in the water.

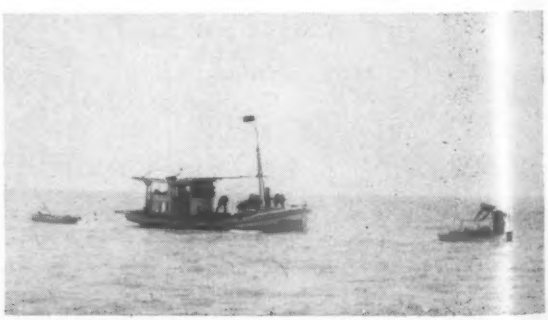
Plan of Operation

Each day for the past few months when the waters have been smooth enough to permit work, the seismograph fleet, led by the flag-bedecked backsight boat, has departed from the Cameron docks at dawn, and returned at dusk. The adverse weather conditions which confront land parties cannot be compared with the adverse working conditions encountered in the gulf. It is often too rough for operations when local weather conditions are quite fair.

When the five boats arrive on location, backsights are set by the crew in the backsight boat. The number of backsights set out depends upon the distance involved



Shooting boat preparing dynamite charge



Recovering geophones before moving to new station

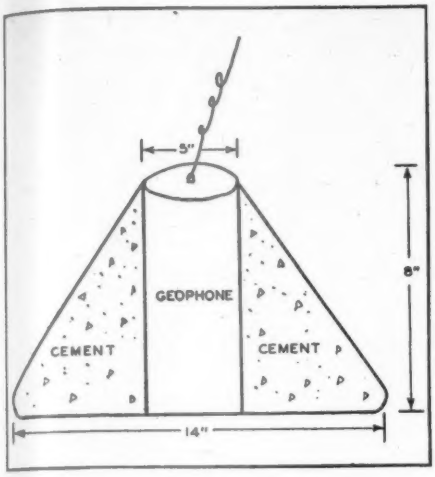


Fig. 3: Geophone as encased in cement

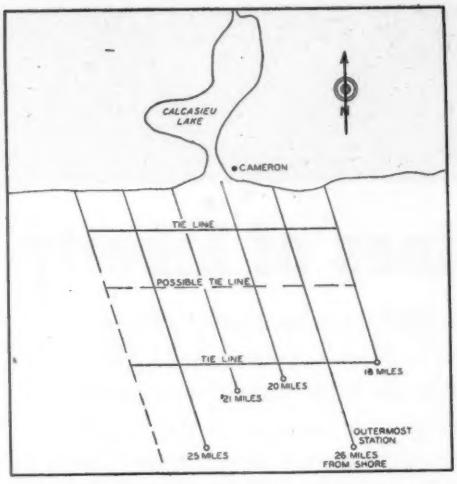


Fig. 4: Profiles followed in distant offshore shooting

and the visibility. Ordinarily they are set from 1,000 to 1,500 ft. apart, the latter distance being used on clear days.

Fig. 2 is a schematic drawing of the typical spread used in the seismic survey. The survey boats work ahead of the recording and shooting boats. Each time the recording boat is anchored, two spreads are shot, one located ahead of the recording boat, and the other behind. In preparing to shoot a spread the recording boat is anchored on location. The shooting boats come along side of the recording boat. One of the shooting boats plants the geophones, marking their location by means of cork buoys. The two shooting boats then proceed to their location 2,000 ft. from the recording boat, and each strings telephone lines to be used in giving instructions from the recording boat. The perfect coordination of the men in performing each individual part of the work at precisely the right time, and the expert maneuvering of the boats is responsible for the setting-up operation being carried out with amazing rapidity even in rough water.

Planting of Shots

As soon as all boats are in their anchored positions, the telephone lines to the shooting boats are tested by the observer on the recording boat. The shooting boats inform the observer as to the depth of the water, and he in turn instructs the shooting boats as to the number of pounds of dynamite to plant. When all is in readiness the observer gives orders to one of the boats to fire. Then, a few moments later, the other shooting boat is instructed to set off its charge. Before the boats move from their location the observer and troop leader make certain that they have obtained a well-balanced seismic record. If either or both of the records are not well balanced, the observer might instruct the boats to plant another charge, using more explosive than on the previous shot. In this area Louisiana permits a maximum of 50 lb. to be used in a single charge. The usual charge, however, amounts to about 10 lb. In shooting, as a precautionary measure against accidents, only one powder charge is made up at a time. The explosive is planted from small outboard-motor boats.

One of the most important problems which had to be worked out in order to conduct the seismic survey pertained to the planting of geophones. In shallow water one method which has been used extensively involves pushing geophones equipped with long spikes into the mud. Such a procedure is impossible in deep water and the geophones were encased in cement. The geophones, or jugs as they are called, have a 14-in. diameter flat bottom and slope upward to a diameter of about 5 in. These are illustrated in Fig. 3. Each geophone weighs approximately 75 lb. The cable connecting the geophones to the recording boat is double-strand, and there is a glass fiber between the two wires which acts as an insulation and at the same time lends strength.

J. S. Rhodes, observer, and R. E. Wilder, chief of party

Fig. 4 gives an idea of distances involved in the profiles shot from shore to a maximum distance of 26 miles in open water. The first shooting was begun during the latter part of March. During this seismic work the energy returns were extremely good. At intervals, however, dead spots were encountered which gave weak returns. Sometimes as high as four consecutive shot points gave weak returns and in these cases it was necessary to use the maximum explosive charge.

An auxiliary piece of equipment used in connection with the shooting of this area is a specially designed survey tower. Airplane tubing was used in its construction to gain maximum strength with the use of as light a material as possible. The tower has an over-all height of 31 ft. and is built in sections to permit ease of transportation by boat. A floor 12 in. in width is built in at the top of the tower, and the tripod holder is held by braces from the legs, so that any movement on the run-around walk at the top will not disturb the setting on the transit. This tower is used when the water is calm and the depth does not exceed 30 ft., to turn a line offshore.

Superior's work in developing a successful technique for distant offshore seismic shooting stands out as a major contribution toward the further advancement of the geophysical accomplishments of the petroleum industry. While present work has proceeded very satisfactorily, considering the marine equipment originally assembled for the job, it is planned to further open water surveys which, no doubt, will bring about an even greater improvement in the technique already developed. Wilder and his crew feel that the efficiency of seismic survey on the water will be greatly increased when new boats, now under construction, are placed in service. Five 50-ft. lugger boats with 15½-ft. beams are now nearing completion and will be assigned to Wilder's troop in the near future. These boats are powered by 100-hp. marine diesel engines.

Frank Devereaux, formerly of Dallas, is now in charge of Hunt Oil Co.'s office in Tallahassee, Fla., covering the southeastern oil area.

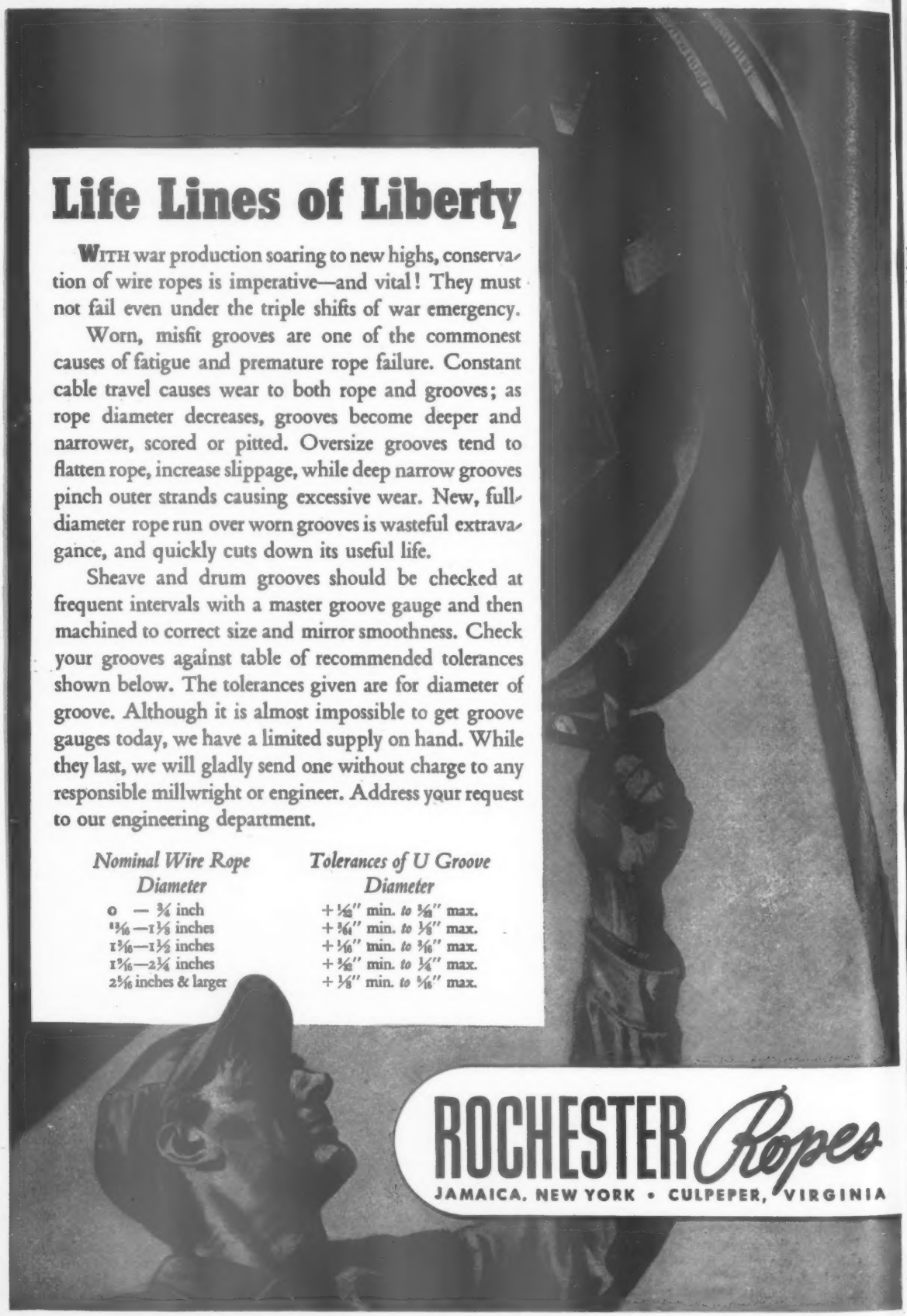
Life Lines of Liberty

WITH war production soaring to new highs, conservation of wire ropes is imperative—and vital! They must not fail even under the triple shifts of war emergency.

Worn, misfit grooves are one of the commonest causes of fatigue and premature rope failure. Constant cable travel causes wear to both rope and grooves; as rope diameter decreases, grooves become deeper and narrower, scored or pitted. Oversize grooves tend to flatten rope, increase slippage, while deep narrow grooves pinch outer strands causing excessive wear. New, full-diameter rope run over worn grooves is wasteful extravagance, and quickly cuts down its useful life.

Sheave and drum grooves should be checked at frequent intervals with a master groove gauge and then machined to correct size and mirror smoothness. Check your grooves against table of recommended tolerances shown below. The tolerances given are for diameter of groove. Although it is almost impossible to get groove gauges today, we have a limited supply on hand. While they last, we will gladly send one without charge to any responsible millwright or engineer. Address your request to our engineering department.

Nominal Wire Rope Diameter	*Tolerances of U Groove Diameter*
0 — ¾ inch	+1/32" min. *to* 3/32" max.
13/16—1 1/16 inches	+3/64" min. *to* 1/16" max.
1 3/16—1 1/2 inches	+1/16" min. *to* 3/16" max.
1 5/16—2 1/4 inches	+3/32" min. *to* 1/4" max.
2 5/16 inches & larger	+1/8" min. *to* 5/16" max.



ROCHESTER *Ropes*

JAMAICA, NEW YORK • CULPEPER, VIRGINIA

A Telephone Dispatching Circuit For the Big-Inch Pipe Lines

*by R. W. Perkinpine**

Solutions for the problems of designing communication circuits for War Emergency Pipelines, Inc., 24-in. crude oil and 20-in. products lines are described in this article. The system adopted is suited to the conditions of noise and fire hazard at the stations so as to provide means for ready communication between the stations and the dispatcher between Baytown, Tex., and Linden, N. J.

IN view of the unusual size and length of the big-inch pipe lines, War Emergency Pipelines, Inc., has found it necessary to have the dispatchers in practically constant communication with each of the 57 pumping stations of the system. A delay of seconds in getting instructions to the various station engineers may result in serious delays in the movement of oil.

To meet these exacting requirements a private-line telephone service has been provided. This service connects the two dispatchers at Cincinnati with all of the pumping stations and nine supervisory offices, thus providing intercommunication between 67 permanently connected telephones of the system. A signaling arrangement is provided to enable the dispatchers to call in any station of the circuit.

Fig. 1 shows the geographical relationship between the pipe lines and the telephone lines over which the dispatching service is routed.

*American Telephone & Telegraph Co.

The "backbone" portion of the telephone circuit, indicated in red, and extending from Houston, Tex., to Newark, N. J., is approximately 1,900 miles in length and is provided over major trunk-line routes of the Bell Telephone System. The total telephone circuit mileage, including side legs, is about 4,200 miles.

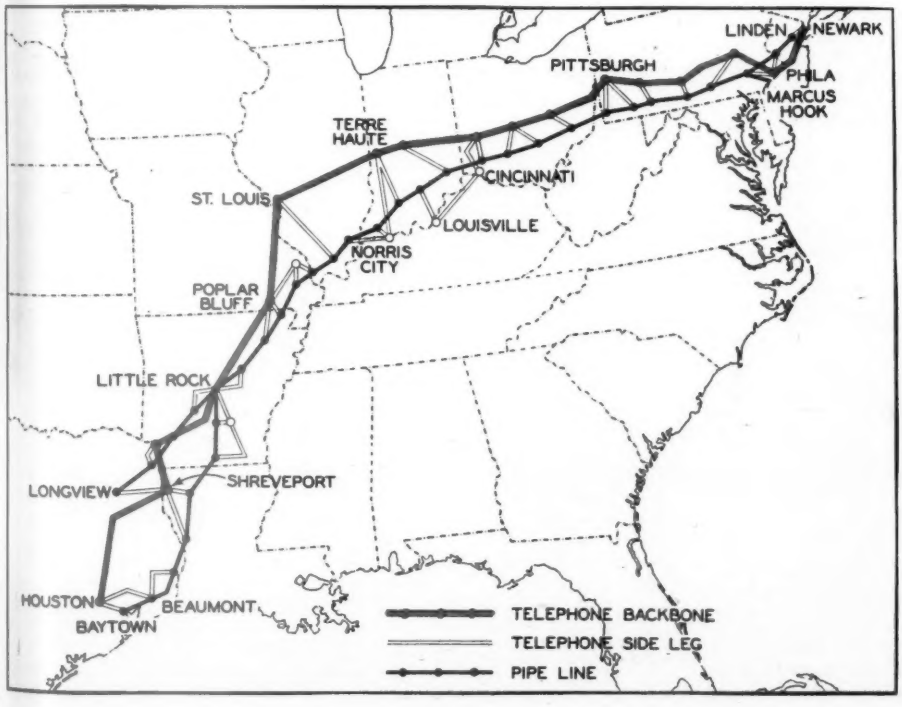
The "backbone plus legs" type of circuit layout provides desirable protection, since a number of suitable facilities may be made available on the backbone route for restoring service in case of a partial failure in any section. In the case of the big-inch circuit, alternate routes are also available which permit the circuit to be routed around a section if there is a total failure.

The average telephone user visualizes a telephone circuit as merely a pair of wires with telephone instruments at each terminal.

In telephone parlance, circuits of this general type which use a common voice-frequency path for transmission in both directions are known as "two-wire circuits." Two-wire-type circuits are used extensively for local exchange service and some of the circuits employed in long-distance service. Difficulties with long circuits of the two-wire type have brought about the use of the four-wire circuit arrangement which utilizes separate transmission paths in the two directions. Fig. 2 shows a typical voice frequency four-wire circuit. It will be noted that, although the circuit operates on a four-wire basis, the telephones at the two terminals are of the normal two-wire type. To care for the transition from four-wire to two-wire operation at the terminals, suitable junction equipment is required.

One of the transmission difficulties experienced on long telephone circuits is "echo." Echo results when part of the energy received at one end of the circuit passes across the four-wire - two-wire junction equipment at that terminal and returns to the sending terminal. If echo currents reached the listener without delay they would not be objectionable. However, on the types of facilities normally used for telephone

Fig. 1: Map showing route of big-inch pipe lines and associated telephone dispatching circuit



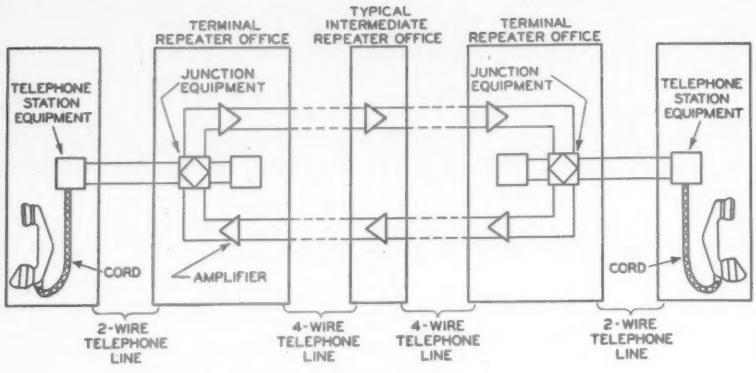


Fig. 2: Four-wire-type telephone circuit

service, the velocity of propagation is finite and varies from somewhat under the speed of light, 186,000 miles per second, for open wire facilities, to about 20,000 miles per second for light loaded cable facilities. The over-all one-way transmission time of the pipe-line circuit from Baytown, Tex., to Linden, N. J., is, for instance, about 0.06 second. When the delay is sufficiently great and the volume of the echo is appreciable, echo on a telephone circuit can become rather disconcerting.

In practice, harmful echoes are eliminated by the use of a device known as an echo suppressor, which automatically short circuits one side of the circuit when conversation is being transmitted in the other direction of the circuit.

The one-way paths used in a four-wire-type circuit may be separate cable pairs or they may be carrier channels. Many of the circuits used in long-distance telephone service are operated over carrier systems. In circuits of this type the voice-frequency currents are raised by modulation to a higher range in the frequency spectrum and four-wire-type operation is obtained by using different frequency bands in the two directions. By using carrier, a considerable saving in line wire can be effected since by this means a number of circuits can be operated over the same wires.

A circuit arrangement of the four-wire type is used for the War Emergency Pipelines circuit. The dispatching circuit is made up of a number of types of telephone facilities. From Newark, N. J., to St. Louis, Mo., cable facilities are used in the backbone layout. South of St. Louis open wire facilities are used throughout. Over the greater portion of this section, use is made of multichannel open wire carrier systems.

The circuit differs considerably from a normal four-wire telephone arrangement layout in that there are 40 branch legs bridged on the four-wire backbone layout, each of which becomes essentially one end of a four-wire circuit. If four-wire - two-wire junction equipment were provided on each of the branch legs for the connection of standard two-wire telephone equipment there would be little likelihood that satisfactory transmission of speech could be obtained.

To avoid the detrimental effects of four-wire - two-wire junctions the four-wire circuit has been extended to the station locations where the circuit terminates in special four-wire telephone equipment. The re-

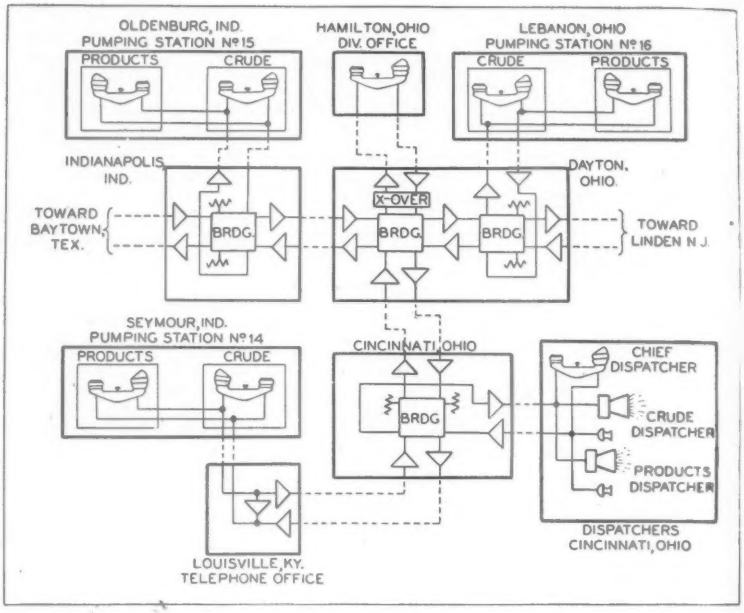


Fig. 3: Simplified layout diagram for central section of the pipe-line dispatching circuit

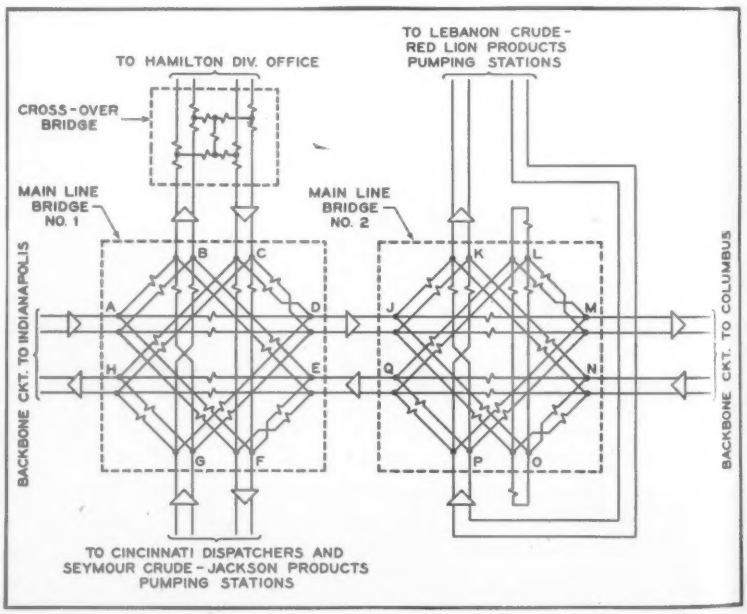


Fig. 4: Circuit schematic of the two four-way special resistance bridges used on the dispatching circuit at Dayton.

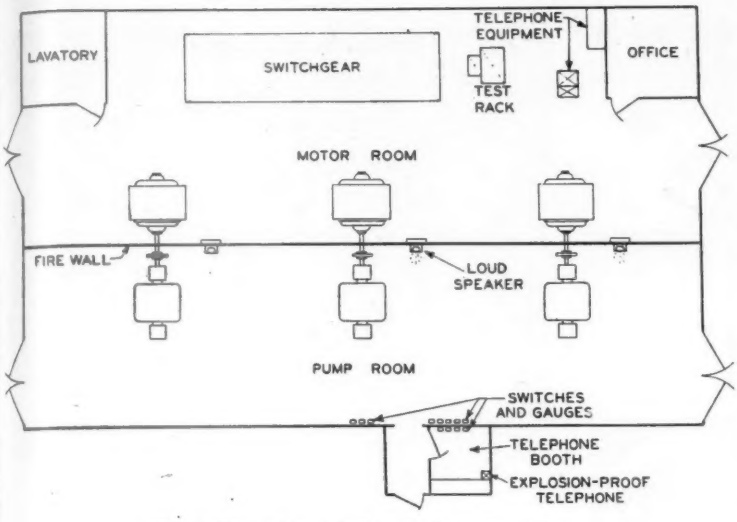


Fig. 5: Floor plan of typical crude pump station

ating in a circuit energized by a single phase 110-volt a.c. tap from the pump station power supply. In order that telephone service may not be interrupted by failure of the station's power supply an emergency power plant is provided which starts automatically and furnishes power for the telephone and signaling circuit should the station's power fail. The power plant consists of a 24-volt storage battery charged by a regulated tube rectifier, and a direct current-alternating current inverted converter. The storage battery has been selected to provide a 24-hour reserve.

The floor plan of a typical crude pump station, showing the motor room and the pump room is indicated in Fig. 5.

In order that the operator at each pump station may be kept advised of conditions along the line and in emergencies receive instructions

sulting circuit is four-wire from end to end, including the telephone instruments. Fig. 3 shows a simplified layout diagram for the central section of the circuit.

At first glance it would appear that echo might be nonexistent. This is not entirely true, however, because of two important concessions made to economize on the use of critical materials. These are the use of a resistance crossover connection between the transmitting pair and the receiving pair on a number of legs feeding into the backbone layout, and the use of a simple carrier system in many of the side legs. This carrier system is designed for relatively short-haul use and utilizes a single carrier frequency and relatively inexpensive filters which permit a slight echo on the circuit.

Since a talker may be located at any one of the various stations along the line, and since the types of echo contributing paths are distributed through the length of the circuit, a single echo suppressor near the center of the circuit can suppress only part of the echoes affecting a given talker. To fully combat echo, two suppressors are being used, one at Terre Haute and the other at Pittsburgh.

Indicated in Fig. 3 are blocks, marked Bridge, in the backbone circuit at locations where side legs are connected. These bridges are the means by which intermediate telephones may be connected to the four-wire circuit. Without these bridges transmission from and to the many intermediate points on the circuit would be greatly complicated.

Fig. 4 shows in schematic form the two bridges of this type provided to connect three side legs to the backbone circuit at Dayton.

Twenty-four of these bridges are being used on the pipe-line circuit. Each is a balanced lattice structure

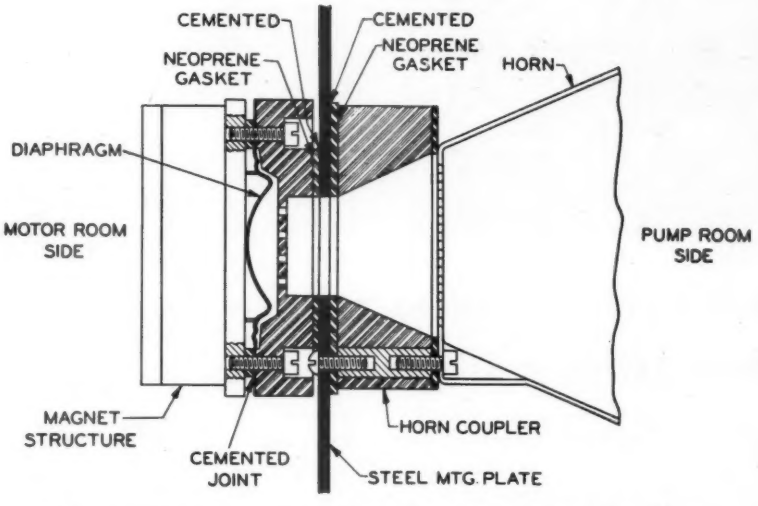


Fig. 6: Cross-sectional diagram of loudspeaker for use in crude pump station

made up of 24 resistances. Each provides four four-wire outlets, two for the backbone line and two for side legs. If more than two side legs are involved, a second bridge is provided, as is the case at Dayton. By means of these bridges, transmission of speech from any station on the circuit to all of the other 66 stations on the circuit is accomplished without introducing unworkable connections between the two directions of transmission of the four-wire circuit.

The side legs are composed of four-wire open wire, four-wire cable, carrier, or combinations of these type facilities. In 22 of the side legs to some of the remotely located pumping stations four-wire-type operation is obtained by using single-channel carrier systems. In 11 of these cases the carrier system terminates in the pumping station.

The carrier terminals used in the side legs contain vacuum tubes oper-

while standing by his control equipment, it is essential that loudspeaker service be provided.

Since the crude-station control equipment is in the pump room, the engineering of loudspeaker service in these locations is complicated by the fact that the atmosphere is at times subject to petroleum fumes or vapors, and must, therefore, be considered as hazardous, in so far as the operation of electrical equipment is concerned. A loudspeaker is not spark-producing in normal operation and if no fault occurs it may operate for years without causing or producing a spark. But since it is operated by electrical energy, safety requirements demand that it be of explosionproof design if operated in a hazardous atmosphere.

Since no explosionproof loudspeaker is readily available it is planned to seal a suitable loudspeaker into an opening in the fire

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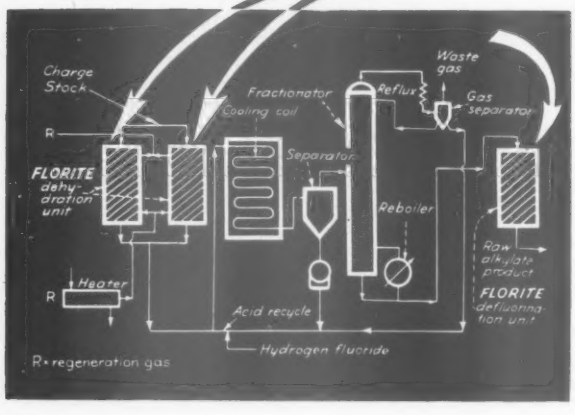

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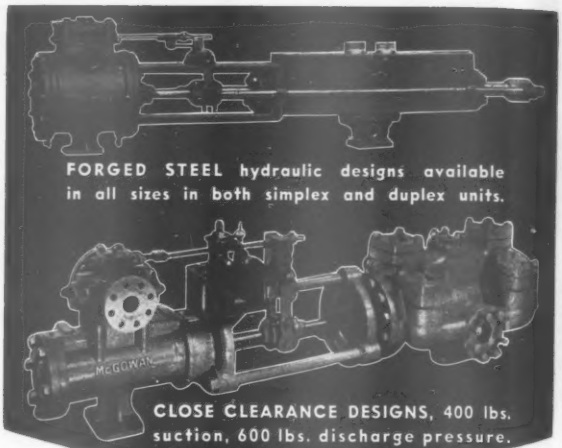
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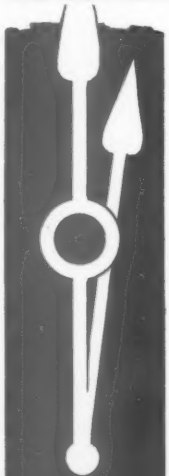

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Fig. 7: Control room in typical products pump station

wall between the pump room and the motor room. The loudspeaker is to be so constructed and mounted that the horn or voice-radiating part is in the pump room and the voice-coil and other electrical components are in the motor room which is considered as nonhazardous in so far as explosive atmosphere is concerned. The proposed loudspeaker now being manufactured for this service is a permanent magnet horn type loudspeaker built into a large ⅛-in. steel mounting plate which is to be sealed into an opening to be prepared in the fire wall.

Fig. 6 indicates a cross-sectional view of the loudspeaker showing details of the gas or vapor-tight construction which permits it to serve as an effective barrier between the atmosphere present in the pump and motor rooms.

A further complication in the provision of loudspeaker service in the pump room is that the loudspeaker must be heard and understood above the noise of the pumps and of the motors in the adjoining room. In the average crude pump room the noise is such that a loudspeaker in the fire wall must talk louder than a man can shout in order to be understood by the pump-room operators.

Another disturbing factor is that the pump room is highly reverberant. Both noise and reverberation reduce intelligibility of speech. Noise can, if not excessive, be overcome by increasing the power of the loudspeakers correspondingly, but without acoustic treatment; i.e., use of sound absorbent material, the effects of reverberation are not so easily overcome. Reverberant sound is differentiated from direct sound as follows. Direct sound is that which travels in a direct path from the source to the ear of the listener without suffering reflection from any object or surface; this is the sound which predominates in the open or in a room having highly absorbent surfaces. In a reverberant room, sound which strikes the surfaces or the walls of the room is only partly absorbed initially, is reflected back and forth, and is only entirely absorbed after a large number of reflections. This sound adds to the direct sound and in an excessively reverberant space, tends to confuse and distort the direct sound. One solution is to provide absorbent material in the room to reduce the reverberant sound. However, in this case an expedient which fitted in well with the mechanical construction described above was adopted. Roughly speaking, if the direct sound and the reverberant sound in a room could be separated, it would be found that the reverberant sound remained about constant throughout the room, but that the direct sound increased as one moved closed to the loudspeaker. In other words, the effects of reverberation are reduced as one moves closer to the loudspeaker. In order that listeners may always be relatively close to a loudspeaker, the need for a number of loudspeakers is indicated. One further consideration involved is the fact that loudspeakers are directive and if the listener is too far to one side of the mouth of the horn, poorer intelligibility results. With the fire-wall location, this consideration also points to the use of a number of loudspeakers. With this arrangement and by shaping the acoustic characteristics of the loudspeakers so as to accentuate those frequencies in the talker's voice which will cut through the pump and motor noise and give the greatest intelligibility of sound, loudspeaker service in the crude-station pump rooms is planned.

The noise in the crude pump rooms is also an important factor to be considered in connection with the telephone arrangement to be provided. As mentioned earlier, it is important that the telephone instrument be located as close as practicable to the control equipment. The type of instrument best suited to the needs of the station operator is a handset.

The satisfactory use of a handset in a location as noisy as the pump room would be doubtful. The noise present would make it very difficult for the operator in the pump room to hear the distant party, and the noise introduced into the circuit would make it very difficult for other parties on the line to hear. If the handsets at all of the 60-odd stations on this large "party" line were picking up room noise and transmitting it to the line, no talker would have much chance of being heard and understood.

To overcome these difficulties a small room has been provided at the side entrance to each crude-station

Fig. 8: Dispatcher's office at Cincinnati showing crude and products dispatchers at work

pump room. This room, which serves as an office and telephone booth, is indicated in the lower portion of Fig. 5. With the door and windows closed, the room noise is approximately the same as that in any ordinary small office. To prevent extraneous noise going out over the telephone circuit, a foot switch has been provided which must be operated whenever it is desired to talk. To listen on the line using the handset it is only necessary to remove the handset from its hanger on the wall.

Since the atmosphere in the crude pump room and phone booth is considered hazardous, all telephone equipment and associated wiring in these locations are of the explosionproof type.

In the pumping stations along the products line, the pipe-line control equipment is located in a control room which is separated from the pump and motor rooms by a fire wall. Since the atmosphere in the control room is not considered hazardous, telephone and loudspeaker equipment of the nonexplosionproof type is being used in these locations.

Loudspeaker Equipment

In order that both hands of the two dispatchers may be free to chart, to dial, or to attend to other duties, each man is equipped with a loudspeaker and with a chest-supported special telephone transmitter. The other telephone instruments shown are for local telephone service and are not associated with the private line.

Under each dispatcher's desk is a foot bar which serves as his push-to-talk control. With the foot bar up or unoperated he listens to his loudspeaker. With the foot bar depressed his transmitter is connected to the circuit and his loudspeaker volume drops. This drop in volume is required to prevent his loudspeaker from interfering with his talking.

The dial which is used to signal the stations and supervisory offices is installed at the right of each dispatcher.

Of the 67 telephones connected on the dispatching circuit, nine are in the supervisory offices, namely those of the division and district superintendents and the chief dispatcher. The arrangements provided in these offices are very similar to those in the products-stations control rooms, except that smaller loudspeakers are used.

The objective in the design of this telephone dispatching arrangement was to provide a convenient, rapid, and reliable communication system for controlling the operation of the War Emergency Pipelines. Experience with the use of this communication system shows that the objective is being attained.

Planning the Drilling Campaign Under Present Conditions

by Paul Reed

IN the development of an oil field a number of factors must be considered in making plans for drilling programs. For these it is important to determine in advance, as nearly as possible, the profit in prospect from such operations. An example of calculations for this purpose, under existing conditions of drilling and producing, is presented which is based on the development situation of recent months in sections of the Dorcheat-Macedonia area of southern Arkansas where there has been a possibility of paying out wells costing $87,000 to $92,000 in 1⅝ to 1¾ years for wells drilled 8,870 to 8,955 ft. into the Smackover lime and dually completed in the Cotton Valley series between 6,000 and 8,400 ft.

The general practice is to drill to the bottom with rotary. Pipe used consists of 100 to 350 ft. of 13⅜-in. for surface pipe cemented with 200 to 370 sacks; 2,200 to 4,000 ft. of 9⅝-in. intermediate casing cemented with 1,000 to 1,900 sacks; 8,870 to 8,955 ft. of 5½-in. oil string through the producing section of the Smackover lime cemented with 1,000 to 2,500 sacks; and 2-in. tubing. In certain wells in the area cost of pipe, cement, float shoes, collars, 13⅜-in. by 9⅝-in. by 5½-in. casinghead assembly, tubing head, retainer-type packer and well connections has been approximately $26,375.

Turnkey contracts for drilling including derrick, pits, water, fuel, etc., including completing in the Smackover lime have been reported to be let for $45,000 to $50,000.

Other Expenses

Other expenses including day work in the Cotton Valley series with coring at $450 per day and completing at $400 per day have frequently totaled approximately $7,500. Electric logging, cementing and gun-perforating services have been $2,200 to $2,400. Drilling muds have cost $900 to $1,200 in numerous cases; fuel gas for day work, $500 to $600; supervision, transportation, engineer and geologist, $900 to $1,000; clearing location, building road, roustabout and gang labor, $1,500 to $2,000; and drilling permit, $50.

In equipping leases with surface equipment, it is common practice to use a large amount of wooden storage tanks because of the steel shortage and the corrosive effect of hydrogen sulfide. Both single and double separators are used. Most producing properties in the pool are operated by McAlester Fuel Co. on a flat monthly fee basis.

The rate at which income may be anticipated is estimated on the basis of present market of $1 per barrel for crude oil, $1.25 per barrel for distillate and 3½ cents per 1,000 cu. ft. of natural gas.

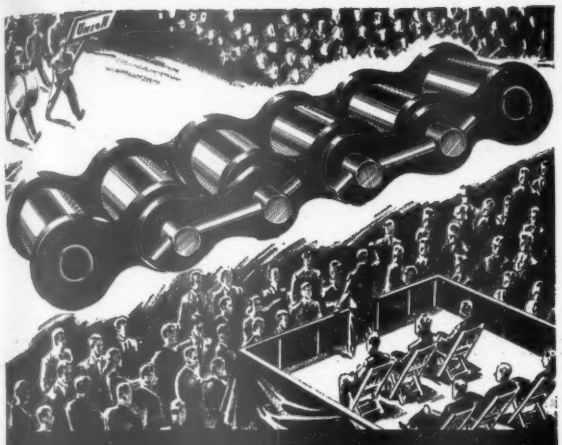
The demand for natural gas governs the rate of production from the Smackover lime which is announced in orders of the Arkansas Oil and Gas Commission. The demand varies but recently the average per well producing from the Smackover is approximately 150 bbl. of oil or condensate and 1,500,000 cu. ft. of sour gas daily.

The arrangement for the Cotton Valley section has been a modified volumetric system of proration. The base for each well is 100 bbl. of oil or distillate and 700,000 cu. ft. of gas daily. This allows a well to produce daily 700,000 cu. ft. or 100 bbl. of oil or condensate, whichever is produced first.

Spacing has been determined so that each well must be drilled within 150 ft. of the center of the north half or south half of a governmental quarter section with unitization in 80-acre units. If a well will produce from the Smackover lime, it must be completed there and dually completed or recompleted to produce from a zone of the Cotton Valley formation.

Estimates in recent months indicated reserves per acre in the Cotton Valley section to be 21,283 bbl. of oil and condensate associated with 30,000,000 cu. ft. of sweet natural gas and in the Smackover lime 3,000 bbl. of oil and condensate associated with 23,000,000 cu. ft. of sour natural gas. The possible total reserves for a quarter section are estimated as 8,500,000,000 cu. ft. of gas and 3,900,000 bbl. of oil and condensate.

Predictions for the Cotton Valley section are based on the following assumptions: Volume per acre-foot, 7.758 bbl.; porosity 20 per cent; connate water 25 per cent; shrinkage due to liberated gas, 35 per cent; recovery of oil in place, 35 per cent; thickness of oil formation, 68 ft.; area units, 160 acres.



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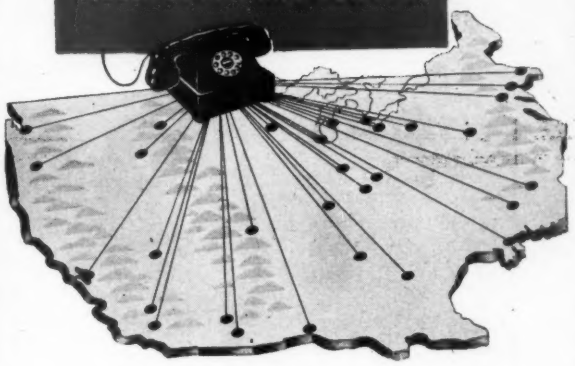

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Time-Saving Computing Instruments Designed for Spectroscopic Analysis

*by T. D. Morgan and F. W. Crawford**

Seven-component computer operated by one of the authors, T. D. Morgan. At the left is a four-component "breadboard" model

One of the difficulties in spectrophotometric work in the analysis of hydrocarbon mixtures, so necessary to complete rapidly in our present-day refining and synthetic-rubber manufacture, is the computation necessary for each step. This article outlines in exact detail two instruments developed to compute these results electrically in very short periods of time. Two instruments are presented, one which solves seven equations in seven unknowns as employed at the Plains butadiene plant laboratory at Borger, Tex., and one developed for reducing spectrophotometer data to extinctions. Both instruments are of primary importance for analysis of hydrocarbon in modern refining.

CHEMICAL plants over the country, having reached an all-time high in the production of critical war materials, depend on rapid analytical methods as a guide in keeping "on stream." Successful applications of spectroscopic methods to these analytical problems have shortened the time interval from sampling to completion of an analysis at a big saving in technical manpower. The principal time consumed now in a multicomponent analysis by spectrophotometry is due to the rather lengthy computations. Several short-cut mathematical methods have been developed in attempts to reduce further the over-all time for completion of an analysis but this article presents a method of demonstrated usefulness as well as a description of electrical computing instruments for carrying out the steps of the method.

One instrument herein described will in principle quickly solve any set of simultaneous equations of the type ordinarily encountered in either absorption spectrophotometry or mass spectrometry. In particular, an instrument for solving seven equations in seven unknowns has been developed and its practicability demonstrated in field tests at the Plains butadiene plant laboratory, Borger, Tex. Also, a second instrument has been developed for reducing spectrophotometer data to extinctions.

When an infrared spectrophotometer is used for making analyses of multicomponent mixtures the data consist of galvanometer deflection readings. These deflections are caused by approximately monochromatic infrared light reaching a sensitive thermocouple. Two deflections are read at each preselected wave length; one (I_o) with an evacuated cell in the light path and the other (I) with the same cell containing the unknown mixture in the path. The extinction (K) of the absorbing gas is defined as log I_o/I. The computation necessary to get these extinctions may be done in logarithms, slide rule or by the electrical computing machine explained below in which every mathematical operation in the above computations has an electrical or mechanical counterpart.

By way of illustration, here is a set of simultaneous equations such as are encountered in the process of analysis by infrared spectrophotometry. These equations are set up from instrument calibration and sample data where

x, y. z . . . are per cents of the components of the mixture.

A, B, C . . . are extinction coefficients from instrument calibration.

K . . . are extinctions measured at appropriate wave lengths for a particular sample.

Equations 1:

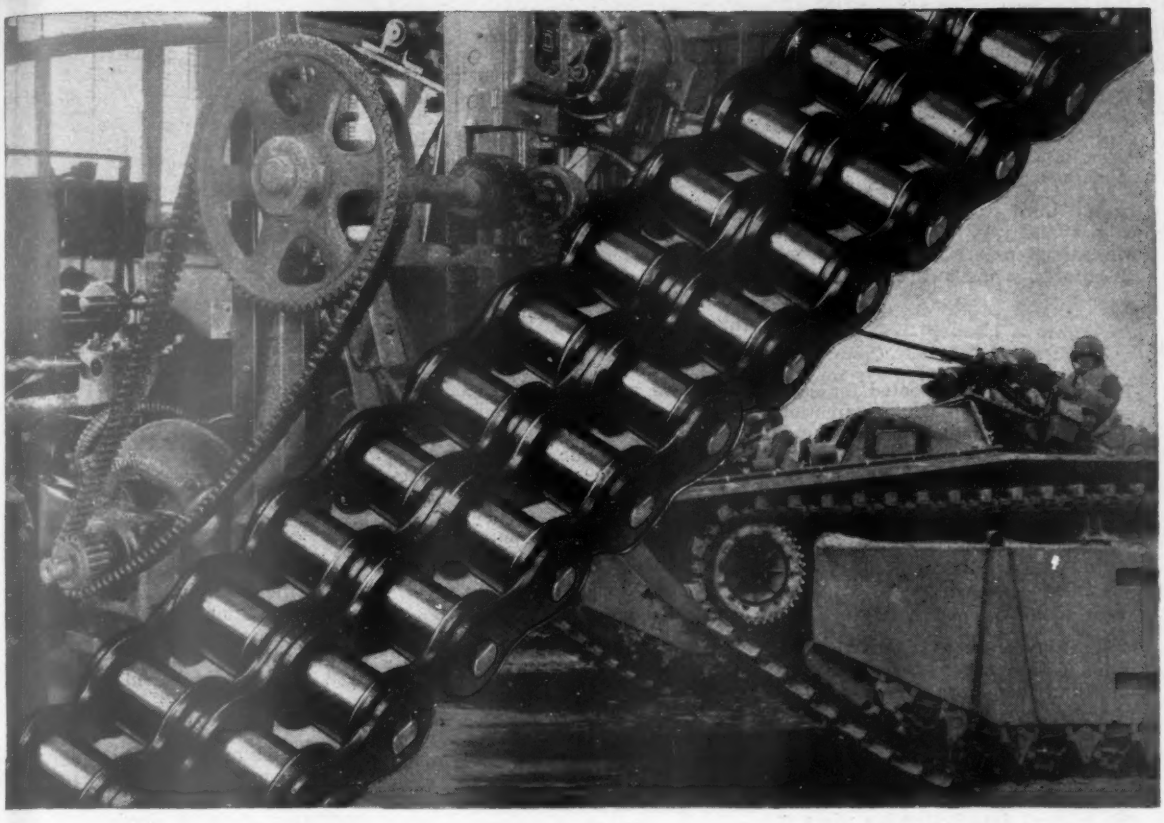
$$A_1x + B_1y + C_1z \ldots = K_1$$
$$A_2x + B_2y + C_2z \ldots = K_2$$
$$A_3x + B_3y + C_3z \ldots = K_3$$
$$\ldots\ldots\ldots\ldots\ldots\ldots$$
$$\ldots\ldots\ldots\ldots\ldots\ldots$$
$$A_nx + B_ny + C_nz \ldots = K_n$$

The method and machine of this paper work best when in these equations A_1, B_2, C_3 . . . are large compared to the other constants.

Method of Computation by Successive Approximations

The method of solution herein outlined consists in systematically making successive approximations to the correct solution of the problem. By this method it is first assumed in Equations 1 that the extinctions of all the components except x are negligible, so that to a first approximation $x' = K_1/A_1$. (Primes of the variables x, y, z . . . will be used to indicate the order of approximation.) In the second of Equations 1 assign the value of x' to

*Research department, Phillips Petroleum Co.



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x and assume that the extinctions of all the components except x and y are negligible so that

$$y' = \frac{K_2}{B_2} - \frac{A_2}{B_2}x'.$$

In the third of Equations 1 assign $x = x'$ and $y = y'$ and assume that all extinctions are negligible except those of x, y and z; then

$$z' = \frac{K_3}{C_3} - \frac{B_3}{C_3}y' - \frac{A_3}{C_3}x'$$

This procedure is repeated for each equation until a first approximation for each component has been found. A second approximation of x, designated as x'', is computed by assigning the first approximations to all the components except x, which yields:

$$x'' = \frac{K_1}{A_1} - \frac{B_1}{A_1}y' - \frac{C_1}{A_1}z \ldots$$

Similarly a second approximation is found for each component. It will be found that after a few approximations have been calculated, each successive approximation yields values not much different from the answers of the preceding approximation. The experimental errors of the original data determine when it is impractical to carry successful approximations further. The accuracy will usually be of the order of 1 per cent when the spectrophotometer is of the small routine type.

The mathematical representation of what happens when successive approximations are made is illustrated by a consideration of the following set of two simultaneous equations with two unknowns. A two-equation system was chosen for this presentation for simplicity although the expansion may be carried out for a system containing more than two unknowns with similar conclusions.

Beginning with x and carrying out a number of successive approximations to y in the system:

Equations 2:

$$A_1x + B_1y = K_1$$
$$A_2x + B_2y = K_2$$

the mth approximation of y

$$= \frac{K_2}{B_2} - \frac{A_2K_1}{B_2A_1} + \frac{A_2B_1K_2}{A_1B_2^2} - \frac{A_2^2B_1K_1}{A_1^2B_2^2} + \frac{A_2^2B_1^2K_2}{A_1^2B_2^3} - \frac{A_2^3B_1^2K_1}{A_1^3B_2^3} + \frac{A_2^3B_1^3K_2}{A_1^3B_2^4} - \frac{A_2^4B_1^3K_1}{A_1^4B_2^4} \ldots \frac{A_2^{m-1}B_1^{m-1}K_2}{A_1^{m-1}B_2^m} - \frac{A_2^mB_1^{m-1}}{A_1^mB_2^m}K_1$$

As a test for convergence in the foregoing series let us consider the ratio of the last term of the series to the next to the last term: A_2K_1/A_1K_2 or substituting equivalent values for K_1 and K_2:

$$\frac{A_2A_1x + A_2B_1y}{A_2A_1x + A_1B_2y}$$

If this ratio is less than one or if $A_2B_1 < A_1B_2$, the series converges. In the general set of Equation 1 if $A_1 > B_1$, $A_1 > C_1$ . . . and $B_2 > A_2$, $B_2 > C_2$ . . . and $C_3 > A_3$, $C_3 > B_3$, the series of successive approximations converge rapidly so that the method yields a sufficiently accurate solution to the simultaneous equations in a few computation cycles. In infrared spectroscopy this means that if wave lengths can be chosen at which only one component causes chief absorption, then the above method of calculation may be used to advantage.

Order of Solution of Equations 1

It is found in practice that the order in which the Equations 1 are placed influences to a large extent the number of successive approximations required to obtain correct answers. While an attempt is made to select a wave length for each component at which only that component causes chief absorption, it is not always possible to do this. Consideration of Equations 2 in the following form will illustrate how the order of calculation changes the number of successive approximations required to obtain a satisfactory solution:

Equations 3:

$$x + \frac{B_1}{A_1}y = \frac{K_1}{A_1}$$
$$\frac{A_2}{B_2}x + y = \frac{K_2}{B_2}$$

In this set of equations if B_1/A_1 y is very small compared with K_1A_1 then the first approximation of x is very nearly correct as also is the first approximation of y. If

$$\frac{B_1y}{A_1x} < \frac{A_2x}{B_2y},$$

a correct solution to the equations may be found with fewer successive approximations when x' is found first than when y' is found first. Since the variables appear in the above condition, it is necessary to have a rough knowledge of sample composition in order to make the best selection of calculating order.

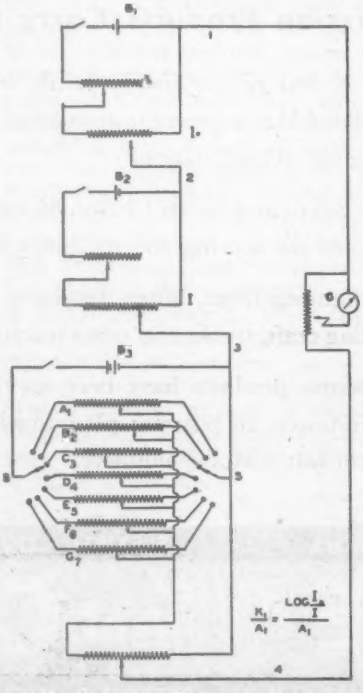

Fig. 1—Electrical diagram of extinction computer

Electrical Computing Machines

All of the mathematical operations of this computation method may be carried out by the proper addition and subtraction of electrical potentials. We use two machines for this; one to convert spectrophotometer readings to extinctions, necessary only in absorption spectroscopy, and the other to solve the resulting simultaneous equations. The first of these, the wiring diagram of which is shown in Fig. 1, is used to take the logarithm of the I_0/I and divide this by a constant. This converts I_0 and I readings from the spectrophotometer into K_1/A_1 and K_2/B_2 of Equations 3. To do this, two linear voltage dividers with logarithmic scales are arranged so that the potential of one is subtracted from the potential of the other. (Logarithmic voltage dividers with linear scales could also be used.) Referring to Fig. 1 the potential between points 1 and 3 is proportional to $\log I_0/I$.

To set the computer for a given value of A_1 it is necessary only to set potentiometers I_0 and I at typical values, then set potentiometer

$$\frac{K_1}{A_1} = \frac{\log I_0 - \log I}{A_1}$$

and adjust potentiometer A_1 until the galvanometer reads zero. The functional details of this circuit can be followed by a straightforward application of Kirchhoff's law.

Fig. 2 is a wiring diagram of the electrical computing instrument for solving simultaneous equations. A four-component system was chosen for purpose of illustration although the instrument was actually built for

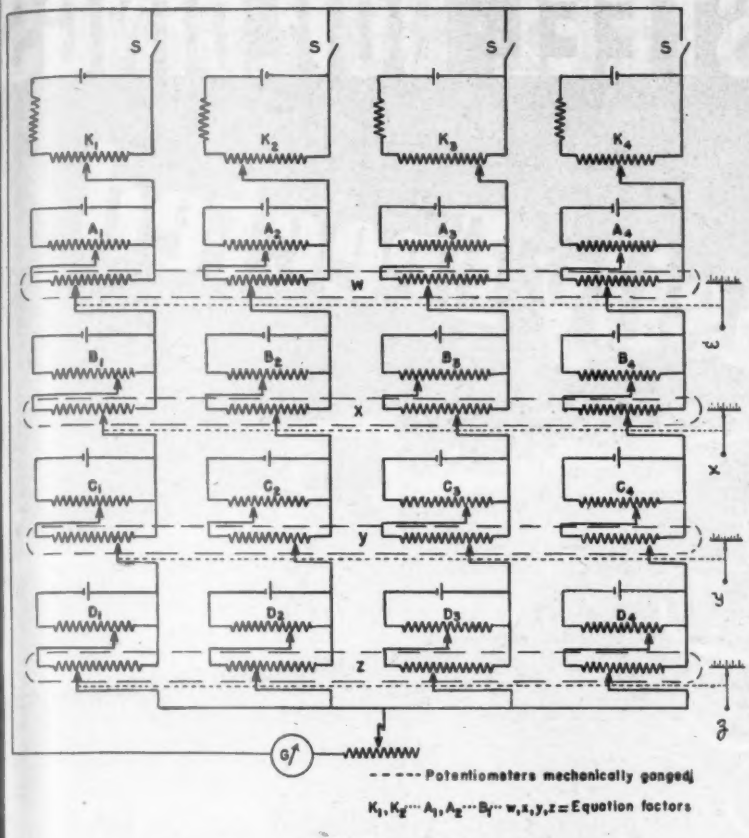

Fig. 2—Electrical diagram of computer for four linear simultaneous equations with four unknowns

seven components. In the following set of equations all variables and coefficients are real:

Equations 4:

$$w + \frac{B_1x}{A_1} + \frac{C_1y}{A_1} + \frac{D_1z}{A_1} = \frac{K_1}{A_1}$$

$$\frac{A_2w}{B_2} + x + \frac{C_2}{B_2}y + \frac{D_2}{B_2}z = \frac{K_2}{B_2}$$

$$\frac{A_3}{C_3}w + \frac{B_3}{C_3}x + y + \frac{D_3}{C_3}z = \frac{K_3}{C_3}$$

$$\frac{A_4}{D_4}w + \frac{B_4}{D_4}x + \frac{C_4}{D_4}y + z = \frac{K_4}{D_4}$$

The A's, B's, C's and D's of these equations are proportional to the extinction coefficients of w, x, y and z respectively, at wave lengths L_1, L_2, L_3 and L_4. K_1, K_2, K_3 and K_4 represent total extinctions of the sample at wave lengths L_1, L_2, L_3 and L_4, respectively. Negative quantities may be handled by the use of reversing switches on the cells of Fig. 2. Expansion of the computer for use with a greater number of components is straightforward. For example to convert the computer of Fig. 2 to one for five components each vertical row of Fig. 2 would be expanded to contain five battery circuits (in addition to the K circuits) and there would be five vertical rows insteadd of four. Referring to Fig. 2, it will be noticed that each vertical row contains five cells; the polarity of these cells is dependent upon whether positive or negative terms appear in the equation. Fig. 2 is arranged for all positive terms so the polarity of the potentiometers representing total extinction is the reverse of the polarity of all the other potentiometers. Each cell is connected across a combination of two potentiometers, each of which is set to a value proportional to its counterpart in the equations. Of each pair of potentiometers the one closest to the cell should be low in resistance compared to the other one for the system to perform exactly according to the theory of the computational method but in the present instrument all the potentiometers are alike and no problems have been encountered which would not converge to a solution on the computer. This makes it possible to order a large number of one kind of potentiometer and select the best ones for critical parts of the circuits.

When the total potential from all of the cells of one circuit is zero, indicated by zero galvanometer deflection, the equation represented by the circuit is balanced. When all circuits are in balance, all equations are balanced and the solution may be read off of the dials.

Details of Setting Coefficient Potentiometers

Calibration of the computer of Fig. 2 is done by setting the dials on the "A," "B," "C" and "D" potentiometers according to the spectrometer calibration data. This may be done by assuming in Equations 4 that all the variables except w are zero and hence that w equals 100 per cent. The right-hand member of each equation is then known and these values are set up on the respective dials of the "K" potentiometers in Fig. 2. Each circuit is then balanced by adjusting the dials on the "A" potentiometers. It is next assumed that x is 100 per cent and the "B" potentiometers set, then y and z are each assumed to be 100 per cent while the "C" and "D" potentiometers are set.

Operation of Computer

To use the computer on infrared spectroscopic data, I_0 and I are first reduced to extinctions and divided by the extinction coefficients of principal absorbers on the computer as outlined above. These values are then equivalent to the right-hand members of Equations 4 and are set on the respective dials of the "K" potentiometers of Fig. 2. In Fig. 2, switch S_1 is closed and galvanometer G is zeroed by adjusting the dial of the "w" potentiometers. Then S_1 is opened and S_2 is closed and the galvanometer is zeroed by adjusting x. Circuits 3 and 4 are balanced in a similar manner by adjusting y and z respectively. Returning to Circuit 1 it will be found that the galvanometer no longer reads zero when S_1 is closed, so w is again adjusted to balance the circuit. These zeroing manipulations are repeated until the galvanometer reads zero without turning a dial as each switch is separately closed. When this condition has been reached the solution to the set of simultaneous equations may be read directly from the dials w, x, y and z. Each cycle of these manipulations amounts to obtaining an approximation in the computational method above. Seven circuits can be balanced in about 1 minute and three cycles are usually sufficient to arrive at the answer.

The computation method shown here has been in use for nearly a year. Recently the electrical computing machines were given field tests at the plant and have already saved much time in making analyses.

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Modern Methods Expedite Drilling Deep Oklahoma Wildcat Oil Well

by Paul Reed

The discovery well of the Washington pool, McClain County, Oklahoma, recently opened by The Carter Oil Co., was drilled to a total depth of 11,209 ft., and completed in the second Wilcox sand at 10,631 ft. It currently is the deepest producer in the state. Located in the Anadarko basin, west of the Nemaha Ridge, it is of special importance. This article discusses the formational hazards and mechanical difficulties encountered in its drilling, all of which were readily overcome.

OF considerable importance in Oklahoma development operations was the recent completion of The Carter Oil Co.'s deep discovery well in the Anadarko basin west of the Nemaha Ridge. This new producing area has been named the Washington pool and the discovery well, 1 R. F. Cottingham, located in the C SE SW 4-7n-3w, McClain County, is currently the deepest producing well in the state. Production is obtained from the second Wilcox sand which was found at a depth of 10,631 ft. To thoroughly explore all prospective productive formations, the initial test well was drilled to 11,209 ft., a depth unusual for wells in Oklahoma.

Drilling of the 1 Cottingham was contracted by Olson Drilling Co. and a conventional mechanical-type rig was employed. This drilling rig was powered by three heavy-duty gas engines compounded in such a manner as to apply the full output of the engines to the draw works or mud pump as desired. An auxiliary mud pump was equipped with a fourth heavy-duty gas engine, but this unit was operated independently of the rig proper. As natural gas was not available in the area, butane was used for engine-fuel purposes. Actual drilling operations were commenced on May 28, 1943, with final completion of the well on May 12, 1944. A total of 290 days elapsed from the time of spudding until the oil string of casing was run. Completion and testing operations consumed the remaining 60 days of the over-all 350-day period. In drilling to the total depth of 11,209 ft., 148 bits were used, but only 115 bits were needed to reach the top of the second Wilcox sand. The sand penetrated below 10,631 ft. was quite sharp and abrasive, with the result that frequency of bit changes greatly increased. In drilling the upper part of the hole to set the 9⅝-in. protection string of casing at 6,474 ft., 32 12¼-in. bits were required while 116 7⅞-in. bits were used to drill below the protection string of casing. Some difficulty was encountered in maintaining the proper hole size while drilling the lower part of the Wilcox sand section as the bits were quickly worn out of gage. On numerous occasions it was necessary to ream the lower 10 to 20 ft. of hole in order to reach bottom with a new bit. All of the lower section of the hole below the protection string of casing was drilled with 3-in. drill pipe.

Twelve fishing jobs were encountered during drilling operations, which consumed a little over 12 days' time. For the most part, these jobs were of a routine character and resulted from drill-pipe failures. Only one fishing job is worthy of special mention, and it was necessitated by the drill pipe collapsing while drilling operations were proceeding at 5,650 ft. This drill-pipe failure apparently occurred in a rather badly washed-out section of the hole and considerable difficulty was experienced in getting over the fish with an overshot. After breaking off a 14-ft. section of the collapsed pipe, the remainder of the fish was recovered after spotting crude oil in the hole to free the pipe which had become stuck during the fishing operations. The 14-ft. section of pipe was milled up and/or sidetracked and caused no further trouble. Approximately 3½ days were consumed in this one fishing job.

No difficulty was experienced in maintaining suitable drilling mud while the upper section of the hole was being drilled. Aquagel was added as necessary to improve the viscosity of the mud in order to obtain satisfactory samples of the formations penetrated, but the total amount used was of little importance. A viscosity of 35 to 38 seconds was found to be satisfactory and the water loss was of the magnitude of 25 to 30 cc. However, after setting the protection string of casing, more careful handling of the mud problem became desirable. As previously mentioned, crude oil was used in completing a fishing job and the entire mud system was contaminated to such an extent that all of the

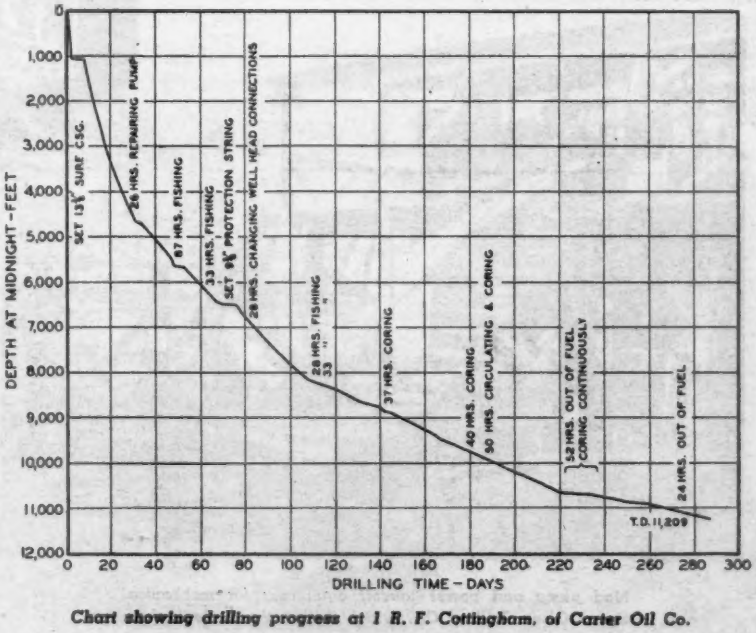


Chart showing drilling progress at 1 R. F. Cottingham, of Carter Oil Co.

mud was discarded after cementing the 9⅝-in. casing. An entirely new batch of mud was mixed using aquagel and baroid. Immediately after mixing the new mud and while drilling the Layton sand section directly below the protection string of casing, the circulating system became contaminated with salt water and gypsum from the Layton formation. At that time the mud was rather light, weighing 9.7 lb. per gallon, and fluid from the Layton sand entered the hole while a trip was being made. The full effect of this contamination was not apparent until a depth of around 8,000 ft. was reached. A troublesome shale section was penetrated below 8,000 ft. and the tendency of this shale section to slough and bridge the hole necessitated rigid control of mud.

Chemical treatment proved satisfactory with caustic soda, quebracho, and soda ash being used to maintain desirable mud characteristics. Of primary importance was a rather low water loss of from 10 to 15 cc. No mud-weighting problem was encountered and the weight was permitted to vary from 9.8 to 10.2 lb. per gallon. While drilling the lower section of the hole, a rather high viscosity of from 50 to 60 seconds was employed to aid in combating shale difficulties previously mentioned. Mud returns were frequently lost while drilling the lower part of the Hunton limestone formation and ground cotton burrs proved very effective in regaining circulation.

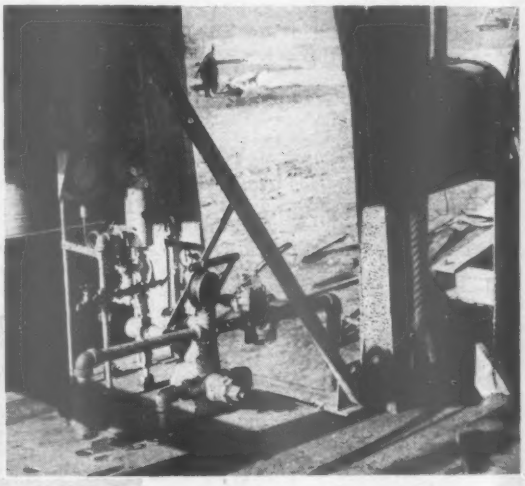
Due to the importance of accurately logging all formations penetrated as well as oil and gas shows, a Geolograph and a portable mud-analysis laboratory, or mud logger, were installed. The Geolograph afforded a complete and accurate rate-of-penetration record and such information was of great assistance to the geologists in accurately logging the formations drilled. The mud logger employed was constructed for the company according to plans which were an adaptation of a Humble Oil & Refining Co. design. Except for the section of hole from 5,650 to 6,488 ft. which was drilled with mud contaminated by crude oil used to free stuck drill pipe as previously discussed, the mud logger was used almost continuously and in all critical sections of the hole.

Casing Program

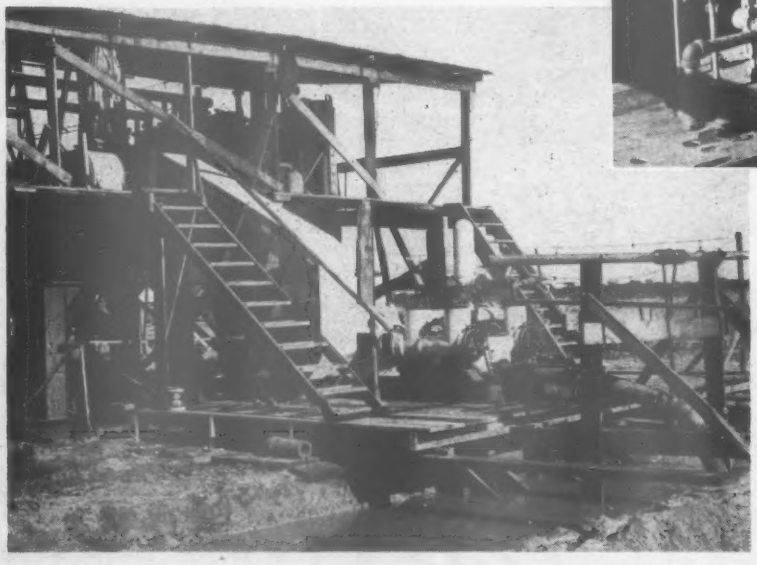
A casing program was employed which provided ample protection against unpredictable subsurface conditions. A 12¼-in. hole was drilled to 1,056 ft. and reamed to 17¼ in. to accommodate 997 ft. of 13⅜-in. casing which was cemented with 1,000 sacks of cement to insure circulation of the cement to the surface. After drilling a 12¼-in. hole to 6,488 ft., 9⅝-in. protection casing was set and cemented at 6,474 ft. with 450 sacks of cement. Below the protection string of casing, a 7⅞-in. hole was drilled to the total depth of 11,209 ft. and 5½-in. casing was set and cemented at 10,781 ft. with 350 sacks of cement. In order to utilize to best advantage casing available under wartime conditions to meet requirements of a well of such depth as the 1 Cottingham, several weights and grades of casing were used. The oil string of casing consisted of five sections designed to meet both collapse and tensile-strength requirements. Commencing at the surface, the casing string was composed of 20-lb. grade N80, 17-lb. grade N80, 17-lb. grade J55, 17-lb. grade N80, and 20-lb. grade N80 pipe. Careful apportionment of the various weights and grades of casing permitted a substantial saving of steel and resulted in a casing string of sufficient strength throughout its length to meet all requirements.

Completion and testing operations consumed approximately 60 days' time. Cores and an electrical log indicated that production could be obtained from the second Wilcox sand to a depth of 10,650 ft. Casing was perforated from 10,625 ft. to 10,640 ft. with 60 bullets and a drill-stem test indicated a production rate of 6 bbl. of fluid per hour, 10 per cent mud, through a ½-in. bottom choke and a 1¼-in. top choke. An additional 40 shots were then spaced from 10,640 ft. to 10,650 ft. and another drill-stem test taken. On this test production amounted to 467 bbl. of oil and 301 bbl. of water in 21 hours through various chokes ranging in size from ⅛ in. to open 2-in. tubing. Extensive testing showed the well to be producing too much water for satisfactory continuous operation and all perforations were squeezed with 150 sacks of cement in an effort to shut off the water believed to be coming from behind the casing instead of from the perforated zone. This squeeze cement job was not

(Continued on page 121)



Right: Blowout-preventer controls and instruments at left, and at right, geolograph for automatically making a continuous record of drilling progress on strip chart



Mud pump and power takeoff equipment for mechanical rig of Olson Drilling Co., which drilled the 1 Cottingham

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

More Reflux Not Required With Fewer Plants

We had a tower explosion which shattered our cast-iron trays. To get going in a hurry we put the few remaining good trays in the bottom of the tower and used side-to-side pans in the top. Now we find that the tower requires nearly twice as much reflux. The tower is used to produce a rough-cut gas oil from a heavy topped crude oil. Some of the gas oil is taken at the top and some from the side of the tower. What can be do about the reflux?—R. C. H.

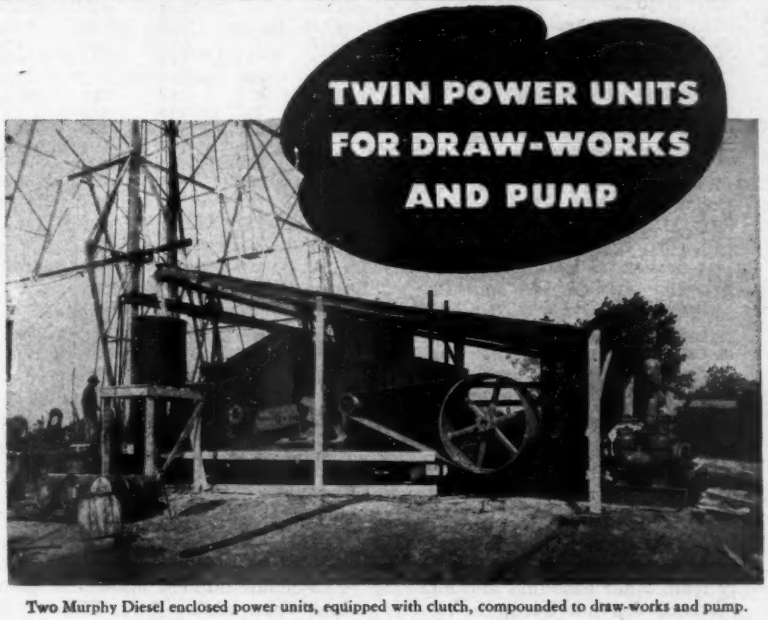
The question indicates that the fractionation of the gas oil is of little importance. If so, the use of fewer plates or of plates that are not efficient (side-to-side pans) should make little or no difference in the amount of reflux required. In one important sense, a refinery fractionating tower may be considered to be a condenser and cooler. Hot material enters the tower and and the several products leave the tower at lower temperatures and all of the products except bottom product and the top product, must be condensed in the tower. All of these jobs require the removal of heat, and heat removal is accomplished by the use of reflux. The temperatures at which the products are removed are directly related to the boiling range or kind of product, and very little can be done about the bulk of the material that composes each product. In other words, the composition of each of the products is dependent on the composition of the feedstocks, i.e., no fancy operation is available by which more (or less) gas oil can be made than the gas oil contained in the feedstock. The products can, however, be poorly separated from one another, and this results in some variation in the quantity of each product. But such changes in composition (and amount) do not greatly affect the temperatures at which the products are removed, and consequently the total amount of reflux (cooling) that is required.

The idea that towers with only a few plates will require more reflux than towers having a large number of plates, does not always apply to petroleum towers. The only ways that the amount of reflux can be changed much are: (1) Use a reboiler at the bottom of the tower (very uncommon), or (2) heat the feed to a temperature far above the temperature required to vaporize the overhead products.

The behavior related in the question can only be explained by conditions which have not been stated in the question. The feed temperature must have been increased, and either more gas oil was produced from the side of the tower or the gas-oil side-draw valve was not opened wide enough to withdraw the extra gas oil that was being vaporized. If the latter was the situation, then gas oil (reflux) was flowing past the gas-oil draw plate and back into the topped crude oil.

Lead Susceptibility of West Texas Gasolines

I was much interested in your discussion of West Texas oils in the issues of June 10 and July 8. I should like to determine in connection with these discussions addi-



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tional data on the lead susceptibilities of gasolines from various types of crudes. I have heard that the lead susceptibility of certain sulfur crudes is materially increased by removal of the sulfur. Could you compare for me the lead susceptibility of gasoline from various crudes, both sweet and sour, and particularly those employed in aviation-gasoline manufacture before and after desulfurization?—R. U. F., Jr.

Although general or average values of lead susceptibility can be given, the value of such generalizations is not great because each gasoline (or crude oil) behaves differently from other gasolines and analysis methods are not adequate for disclosing why some gasolines are different from others. Reduction in the percentage of sulfur always improves the lead susceptibility but sometimes the improvement is great and with other gasolines the improvement is so small as to be of negligible economic significance. Thus, the only sure method of approach is to determine the lead susceptibility for each gasoline.

On the Questions on Technology page of November 27, 1941 (pp. 68-76) the lead susceptibilities of about 100 gasolines were listed, but only a few of the gasolines were from high-sulfur crude oils. Average lead susceptibilities of several kinds of gasoline are:

	Avg. Oct. No.	Average increase in octane number: 1 cc. TEL	2 cc. TEL	3 cc. TEL
Natural gasoline	68.0	9.3	13.8	16.3
Straightrun gasoline	57.5	9.0	14.5	17.8
Cracked gasoline	65.9	5.5	9.2	10.4
Thermudry catalytic gasoline	80.6	5.2	...	9.0

Although the catalytic gasoline looks bad in this comparison it should be noted that the original or clear octane number of the material greatly affects the lead susceptibility, i.e., a straightrun or natural gasoline of 80.6-octane number would probably not have as good a lead susceptibility as the Houdry gasoline. This same difficulty makes it almost impossible to determine the effect of sulfur alone. Here are tabulated a number of low-sulfur and high-sulfur (straightrun or natural) gasolines which may be of value as shown in Table 1.

TABLE 1

Kind of gasoline—	Per cent sulfur	Oct. No.	Increase in Oct. No. with 1 cc. TEL	2 cc. TEL	3 cc. TEL
1. Natural gasoline—12 lb.	0.037	67.2	7.8	12.3	14.5
2. Natural gasoline—12 lb.	0.002	69.5	11.5	15.3	18.0
3. Natural gasoline—18 lb.	0.005	66.7	14.3	19.3	(21.1)
4. Natural gasoline—13 lb.	0.100	62.7	14.3	20.1	22.1
5. Mid-Continent	0.026	58.5	10.0	15.0	18.3
6. Mid-Continent	0.003	59.5	13.9	19.0	21.1
7. 68.7 A.P.I.	0.018	60.5	10.0	15.0	18.0
8. 64.9 A.P.I.	0.033	53.0	10.5	16.5	20.0
9. 62.6 A.P.I.	0.112	63.5	8.0	11.5	14.0
10. 64.9 A.P.I.	0.090	62.0	6.5	11.0	13.5
11. 64.5 A.P.I.	0.064	70.5	8.0	11.5	13.5
12. East Texas—360 e.p.	0.010	61.5	12.0	19.0	20.5
13. Natural gasoline—342 e.p. desulfurized from No. 19	0.004	54.8	13.0	19.4	(21.9)
Average	0.039	62.2	10.7	15.7	18.3
14. 79.3 A.P.I.	0.466	65.0	5.5	8.5	10.5
15. California—435 e.p.	0.290	62.5	6.5	10.0	12.5
16. Slaughter—375 e.p.	0.280	55.0	6.0	(9.7)	13.5
17. Slaughter—385 e.p.	0.234	56.1	(6.1)	(9.8)	11.1
18. West Texas—444 e.p.	0.190	50.5	6.5	11.0	14.5
19. Natural gasoline—340 e.p.	0.260	51.4	6.1	9.8	(12.5)
Average	0.287	56.8	6.1	9.8	12.4

Numbers in parenthesis are estimated values.

Thus, according to this tabulation, the increase in octane number of a 60-octane-number low-sulfur gasoline when adding 3 cc. TEL would be about 19 units, whereas a high-sulfur gasoline of 60-octane number shows an increase of only about 12 units. Stated in another way the octane number of a low-sulfur gasoline with 3 cc. of lead is about 79 whereas a high-sulfur gasoline gives only about 72-octane number. Obviously, different results will be obtained with gasolines of very low or very high clear octane numbers.

Attention should be given to other articles that have appeared in the recent literature.

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A view of one of many plants designed and constructed by Petroleum Engineering, Inc., in the past 15 years of continuous service to the industry. *Petroleum Engineering, Inc. Offices: Tulsa and Houston.*

Two Crudes Processed Separately In Double-Coil Unit

by R. B. Tuttle

Built to conserve critical materials, the recently completed topping unit at Sunray Oil Co.'s Allen, Okla., refinery is operating with two different crudes which are simultaneously heated in a single furnace setting in two separate coils. Overhead from one section of the unit is blended for aviation fuel whereas the other section yields motor fuel overhead.

BY using two sets of heater coils in a single furnace, Sunray Oil Co.'s recently completed topping plant at its Allen, Okla., refinery, is processing two crudes separately and simultaneously. Results indicate that the personnel required for operation of the unit is no greater than that of the average topping plant. Except for the furnace setting the unit is made up of nearly duplicate equipment in each of the parallel sections of the plant. At present one section is processing a mixture of local crudes and the other a Cromwell sand crude; when desired both sections may be combined to process the same oil.

Because the unit was erected during the peak of construction-material shortages most of the equipment was rebuilt on the job site from various salvaged materials. Reconstruction of the towers, which were salvaged from obsolete plants included shell repairs, installation of bubble trays and attaching the nozzles, manholes and base rings. In most cases the heat transfer installations were revamped on the job as needed to meet requirements. All parts used in constructing the heater were new with the exception of structural steel and fittings. Most of the pipe, valves and fittings used in erecting the oil piping for the unit were obtained from new material stocks. Reclaimed pumping equipment which was overhauled on the job is used in both sections of the unit.

Although the unit was constructed largely of salvaged parts it has an over-all appearance equal to that of the average unit constructed of new materials. Design and construction were carried out on a contract basis by the Born Engineering Co. of Tulsa, Okla. All work involving the repairing and the reworking of the various salvaged items was handled in the field along with the construction work by the contractor.

Centralization of control and other facilities common to both sections of the unit contribute to operational convenience and present a balanced plant layout. The heater differs from the common variety in that it has two combustion chambers and a single gas-duct system. Both heater coils pass from a common convective zone into their respective locations in the separate combustion chambers. Heating coil temperatures are controlled automatically by the regulation of fuel-gas flow to the burners. Because each section of the heater coil is equipped with a temperature controller the amount of heat to separate coil systems may be varied independently when desired.

The combustion chambers for each coil are made in the single setting by a wall, which is similar to the standard bridge wall in certain units, extending throughout the length of the furnace and to a height of about 10 ft. Each of the combustion chambers is equipped with floor-type burners. Tube fittings are standard and are arranged in the usual manner within a typical header box.

Process piping is so arranged that the fractionators and the other equipment in either section of the process may be cut in or cut out as desired when running the unit on the different charges for which it was designed to process. The towers in each section of the unit are equipped with side-stream strippers that are elevated for product gravity flow to storage. Sidecut drawoff

(Continued on page 121)

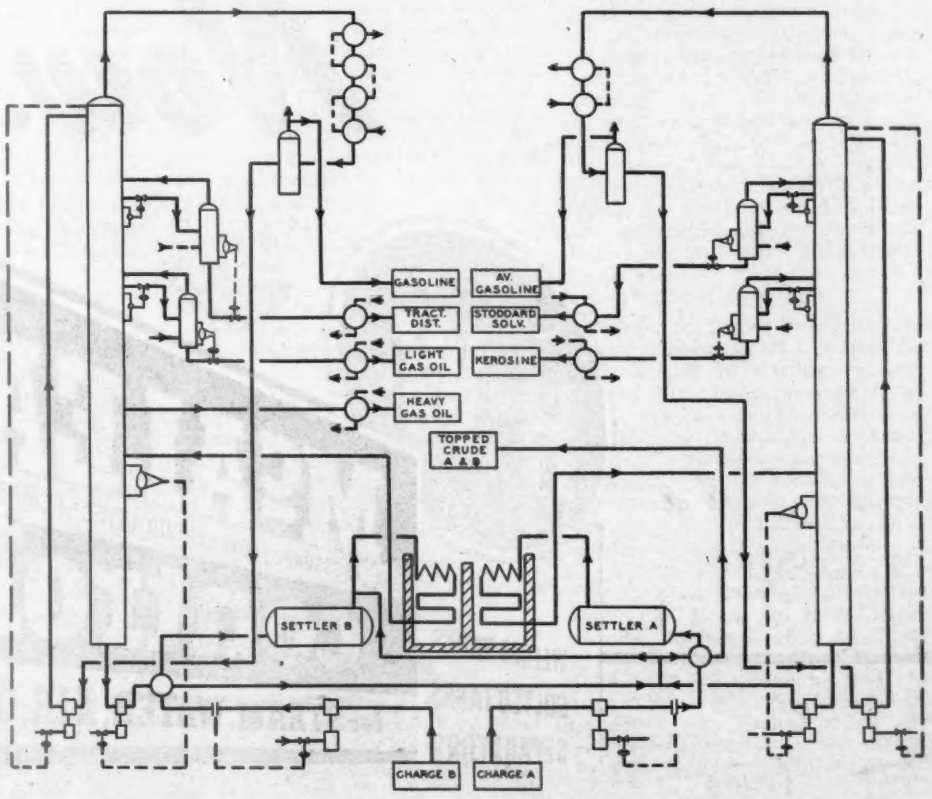

Fig. 1: Simplified flow diagram of Sunray's two-coil topping unit

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Fig. 2: Sunray's double-coil heater and two-tower topping unit

(Continued from page 115)

rates are controlled by an arrangement in which a liquid-level controller, a temperature controller and a special plate in the towers are interconnected so that only the products falling within a predetermined boiling range are automatically allowed to go to storage.

Fig. 1 is a simplified diagram of the flow arrangement of the plant. A general view of the unit is shown in the accompanying photograph, Fig. 2. Charge B, a mixed crude having an average gravity of 35° A.P.I., 0.7 per cent sulfur and 125-130 lb. of salt per 1,000 bbl. of crude is processed at the rate of 2,500 bbl. per day. Salt is taken out of the crude at around 200° F. and 250 p.s.i. in the settler. The overhead from this crude, a gasoline having an octane value of approximately 55, is used for blending to motor fuel. Other yields include the side cuts of tractor distillate, light and heavy oils and bottoms.

A Cromwell sand crude is used for Charge A which averages about 30.5° A.P.I. gravity and contains approximately 200 lb. of salt per 1,000 bbl. of crude and 0.02 per cent sulfur. The charging rate for the Cromwell sand crude is 2,500 bbl. per day. Gasoline from this charge stock has an octane rating of from 72 to 73 and when blended with 3 c.c. of lead produces a 90-91 octane fuel. Stoddard naphtha, kerosene and the residual product comprise the other yields from this section of the unit.

Residual yields from both sections are mixed for a cracking stock. By combining the tractor distillate and the intermediate cuts a 350°-540° F. boiling range butadiene absorption stock is obtained. Flexibility of the unit is illustrated in an operation when one section was rerunning pressure-distillate for an 80-octane all-purpose gasoline at the same time crude was being processed to yield an overhead naphtha.

Equipment has been installed recently for the further desalting of both crude charges with added chemicals which lower the salt to about 6 lb. per 1,000 bbl. This operation aids materially in the treating of finished gasoline, reduces overall treating costs and retards corrosion.

Modern Methods Expedite Drilling

(Continued from page 108)

successful as the perforations were not closed off to indicate that a seal had been obtained. After drilling out the retainer, but without again perforating the casing, a drill-stem test resulted in a production of 379 bbl. of oil and 8 bbl. of water in 11 hours and 45 minutes through chokes ranging in size from ½ to 1 in. During a later 24-hour test period, production amounted to 396 bbl. of oil and 24 bbl. of water through a ½-in. choke. It was obvious that a water shutoff had not been obtained and a second squeeze-cement job was attempted. A total of 76 sacks of cement was displaced through the perforations from 10,625 ft. to 10,650 ft. and a complete shutoff of the water was obtained. After reperforating the casing from 10,625 ft. to 10,645 ft. the well was completed for an initial production rate of 298 bbl. of oil and 243,000 cu. ft. of gas in 24 hours through various size chokes ranging from ½ to 1 in.

During the week May 21 to 27, inclusive, production amounted to 1,402 bbl. of oil and 1,169,000 cu. ft. of gas through a ¼-in. choke. For this 7-day period, the gas-oil ratio averaged 834 cu. ft. per barrel. The tubinghead pressure ranged from 120 to 140 lb. with the casinghead pressure varying from 1,200 to 1,400 lb. Production has been further reduced in recent weeks. Initial tests indicated the gravity of the oil to be 39.7° A.P.I. Reservoir pressure tests revealed a shut-in pressure of 4,630 p.s.i. and a temperature of 184° F.

At the end of almost a year of continuous drilling operations, none of the original crews were on the job. As frequently experienced under existing manpower conditions, a rapid turnover in drilling personnel occurred with two full sets of drillers and four full sets of roughnecks having been employed on this well.

As an outpost well of unusual depth for Oklahoma, drilling and completion operations at 1 Cottingham are significant for operations in an area with interesting future possibilities.

Charles W. Coker, vice president Sonoco Products Co., Hartsville, S. C., and **S. W. Darling,** superintendent The Texas Co., Bayonne, N. J., have been named members of the National Association of Manufacturers' committee on supervisory relations. A foremost object is special training of foremen for the role they must play in postwar rehabilitation.

W. C. Bean, division geologist for Shell Oil Co., Inc., in North Texas and the Panhandle, will be transferred September 1 from Wichita Falls to Tulsa, where he will engage in research work. Bean will be succeeded in Wichita Falls by **George Hardison,** at present his assistant.

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New Equipment

All-Steel Triplex Slush Pump

THE recent trend toward lighter weight and greater mobility in oil-field equipment is reflected in the development and production by Clark Brothers Co., Inc., Olean, N. Y., of a 12-ton all-steel slush pump, designed for heavy duty. Installations already are being made in several locations in the Southwest. The first was at Odessa, Tex., for Rowan Drilling Co.

Compactness of the new pump is shown by its over-all dimensions: Length, less skids, 12 ft. 8⅛ in.; width, fluid end, 75⅝ in.; width, power end, including shaft extensions, 82½ in.; height on power end, 51⅛ in. Thus the apparatus is under 7 ft. in width, an ample margin under the 8-ft. maximum road clearance requirements. It operates on the three-cylinder or triplex double-acting principle, with a master cylinder bore of 7¼ in. and a 12-in. stroke.

A low center of gravity, added to the small over-all dimensions for its rating, make the new pump easily transportable.

The new pump has a maximum mechanical input of 380 hp. at 70 r.p.m. and a maximum hydraulic output of 323 hp. at 70 r.p.m. The fluid end pressure used on actual tests was 6,000 lb., a 100 per cent margin over the 3,000-lb. working pressure in the field. In suction manifold pressure tests the same 100 per cent margin was provided, 4,000 lb. on test, 2,000 lb. ordinary working pressure.

Any one of the three individual cast steel cylinders may be replaced in the field when necessary, with a minimum of electric arc welding, applied to the suction manifold.

The pump has three suction inlets located one on either side and one directly at the end of the pump.

An even hydraulic power flow is one of the attributes of the triplex pump design which is said to have produced remarkable results in field tests and later in actual commercial operation. The pressure variation is reduced to approximately 14 per cent.

This obviously means a reduction in peak loads, which reduces the strain on the prime mover and is expected to result in lower maintenance costs on pump, engines and transmission. The pump has been designed for direct fluid flow, with valve-over-valve construction. Both valves at the fluid end thus can be removed through one valve-cover opening. Discharge valves can be lifted out by hand for examination or renewing. With this construction and close clearance slippage is reduced to minimum.

The crankshaft design permits the use of eccentric hubs on the crank throws, eliminating large connecting-rod bearings.

In the power end, a new feature has been introduced. All connecting-rod bearings and the main bearing in the power end are interchangeable. There are no bolts in the connecting rods or main bearings.

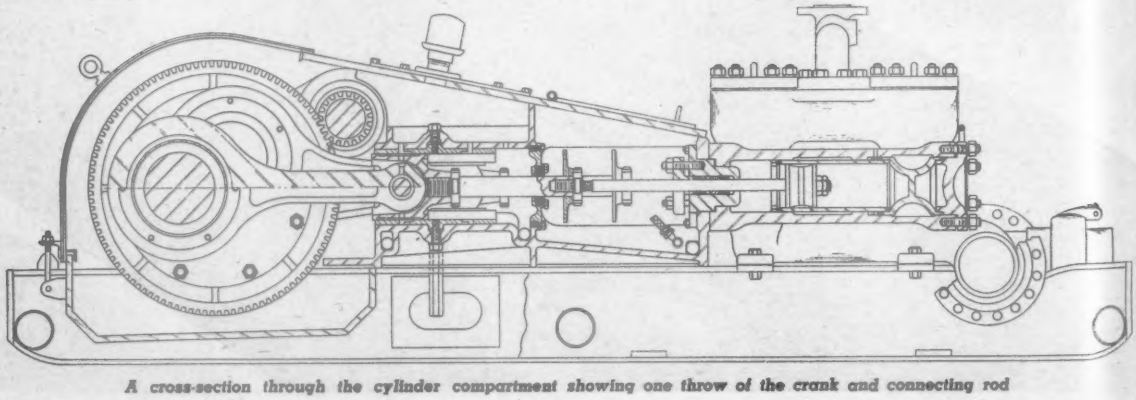
This is a step toward standardization of parts. Another move in the same direction is the use of the same size for all studs in the fluid end, for valve pots and cylinder covers. The engineering aim has been to use standard and readily obtainable parts where practicable, and indeed adapting them to the several unique design features which have been incorporated into this pump.

Rod packing, for example, is standard, as are valves, pistons and rods, and the various roller bearings for connecting rods, main shaft, pinion shaft and crosshead pins.

One safeguard built into the pump worthy of mention is the use of telltale holes, to reveal liner leaks instantly and avoid cutting out the fluid cylinders.

This device for the first time has also been applied to the discharge valve cages for the purpose of revealing leaks.

View of the all-steel triplex slush pump



A cross-section through the cylinder compartment showing one throw of the crank and connecting rod

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Gas-Holder Systems

TANKS and gas systems attached to tanks that permit expansion and contraction of vapor and which, in elaborate systems, may even catch the vapor that is pushed out of a tank during filling, are of the following types:

1. Flexible roof tanks.
2. Balloon or bellows-like roofs (Wiggins).
3. Balloon or bellows-like gas holders (Wiggins).
4. Gas holders with roof floating in a liquid seal (Graver).
5. Gas holders with piston roof sealed by flexible fabric.
6. Fabric gas bag housed inside of tank (Vapor-Mizer).
7. Compressor system for pumping out or admitting gas to tanks.

Flexible roofs such as the Wiggins breather roof are constructed of somewhat thin plate which can expand upward but upon contraction will rest on structural bracing so that the tank cannot collapse. They are used mainly on tanks that are seldom emptied or filled. Insurance against collapse is provided by a pressure regulator set between narrow limits. Breathing losses may be almost entirely eliminated if the crude oil is of low vapor pressure or if the day and night temperature range is small.

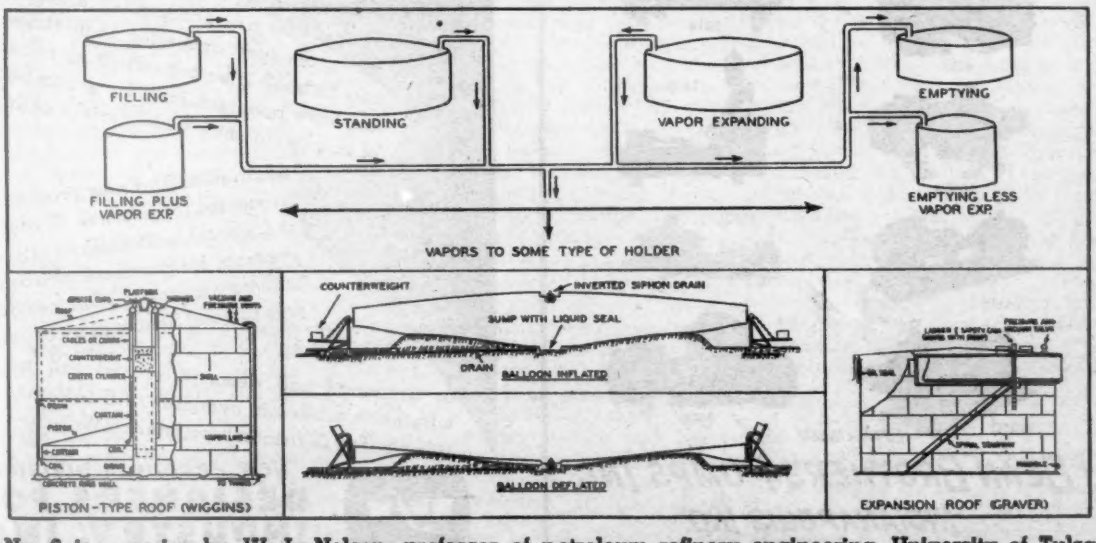
Balloon or bellows-like roofs are similar to flexible roofs except that greater volume change is permitted because the roof is of larger diameter than the tank and because the extension plate can also flex upward and downward. Losses by breathing can be eliminated for crude oils and fairly well for gasolines, but filling losses are not eliminated.

Gas Holders

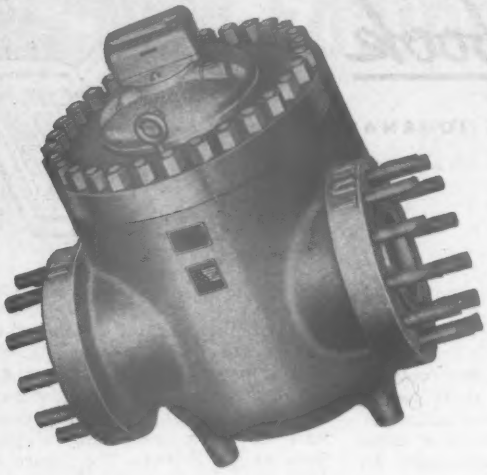
The gas holder installations listed at (3), (4), (5) and (6) above, all function by providing a gas tight expansion space in which vapor accumulates during the heat of the day and then is reabsorbed into the liquid in the tank (or tanks) when the temperature falls at night. Except for unusual volume changes, such as those encountered during filling and emptying, the development of a leak, or the venting of the system for repairs or to eliminate air, no breathing losses occur. Even filling losses may be reduced or eliminated entirely if the holder system is large enough or if several tanks are hooked to one holder so that some tanks can be filling while others are being emptied. A gas holder type roof of limited capacity can be built on a storage tank (Graver expansion roof) and can serve the same general purpose as gas holders. The figure on this page shows several types of equipment that may be used for gas storage. Vapor from sour oils tends to contaminate sweet products if both are connected to one breather system.

Balloon gas holders consist of two circular flexible diaphragms attached to a shallow vertical shell rim which is supported in part during its up and down movement by counterbalance weights around the outside. The lower diaphragm rests on a saucer-like earth grade and the upper one sags into the saucer when deflated or rises as necessary when inflated with vapor.

Gas holders are vertical cylindrical tanks or shells having a roof which either floats in a liquid seal or a counterbalanced roof which is sealed to the tank by a flexible cylindrical curtain. Less ground space is required than for balloon holders.



No. 6 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa



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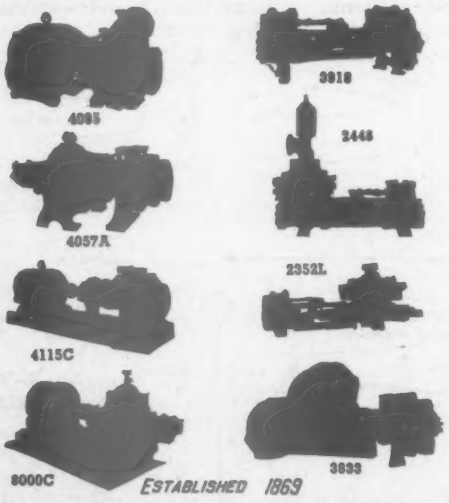

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SQUEEZE-CEMENTING APPLICATIONS

SQUEEZE cementing, employing the cement retainer, is used widely for reducing high gas-oil ratios and for shutting off water in oil wells. There are many variable conditions that require consideration in designing and performing the squeeze job. It is not proposed to discuss here all of the possible variations in detail, but several of the more common applications will be described.

Reducing Gas Production

In many fields a body of free gas, commonly called a "gas cap," is present above the oil and is not separated from the oil by a shale break. In such fields, as the oil is withdrawn a drop in pressure may occur which allows the gas cap to expand. As a result, excessive quantities of free gas enter the wells even though at completion the casing was set low enough to exclude the gas. In this sort of circumstance, a liner may be run through the original casing, cemented opposite the oil and gas pay, and then gun-perforated in the lower part of the oil pay. This sort of remedial work is often effective in sufficiently reducing gas-oil ratios. On the other hand, some wells are completed originally with such a small size of casing that it is not advisable to reduce the hole size any further by running a liner. For this situation, a retainer may be set near the bottom of the casing and cement squeezed under high pressure into the upper part of the exposed pay. In this type of job, it is generally preferable to plug the lower part of the hole by dumping in gravel capped by cement, or similar material, before applying squeeze pressures. Thus the oil pay is given maximum protection against damage from the high squeeze pressures. After the squeeze, the well is cleaned out through the oil pay and possibly perforated or acidized in the lower part of the zone to restore the oil production.

In a similar situation, the casing may have been originally set through the pay zone. In this case, the casing opposite the gas cap may be perforated leaving a short interval of unperforated casing just above the original perforations so that a retainer may be set here as a bridge plug. After setting the bridge plug, another retainer is set above the top perforations and cement squeezed through it into the gas zone. The cement and the retainers are then drilled out and the well recompleted in the oil pay.

In some instances gas immediately overlies the oil and at the time of completion it may be practically impossible to locate the gas-oil contact without drilling at least a short distance into the oil pay. This situation is often handled by drilling slightly into the oil pay, running and cementing casing at bottom, perforating opposite the gas pay, squeezing cement through the perforations, later drilling out the retainer and cement in the casing, and penetrating the oil pay sufficiently to obtain oil production.

Shutting Off Water

Water production from the lower structural parts of an oil field is rather common. Wells may be drilled too deep originally and obtain water; or in edge wells, water may show up because of withdrawal of oil from the reservoir. Ordinary plug-back methods are often effective in shutting off water of this type, but in other fields squeeze-cementing methods produce better results. If the pipe has been set at the top of the oil pay, the squeezing is often done in open hole with the retainer set near the bottom of the pipe. Contact of the cement with the oil zone does not generally have a very harmful effect. At least, in many localities, the water production can be greatly reduced, if not entirely excluded, without materially affecting the oil production.

In certain fields a water sand may immediately overlie an oil sand so that it may be difficult on all wells to obtain a satisfactory exclusion of the water if an attempt is made to set the casing at the top of the oil pay. A common practice in such fields is to drill through the oil pay, cement pipe on bottom, and perforate the lower section to obtain oil. If the water is too closely associated with the oil, the water zone is perforated first, squeezed with cement, and then the oil zone is perforated.

Water may enter a well from an upper zone due to a faulty cement job around the lower part of the casing string. In such instances, the upper part of the annulus around the casing is closed by cement so that circulation cannot be established to recement the pipe by conventional methods. Squeeze cementing, using a retainer set near the bottom of the casing, may be applied in forcing cement up around the pipe in order to shut off water from zones above the casing seat.

Occasionally water is found to enter a well from some upper zone through a leak in pipe that has already been cemented. The procedure is similar to other methods already described. A retainer may be set as a bridge plug just below the leak. A second retainer is set immediately above the leak. Cement is forced, under high pressure, through the leak. The cement is allowed to set and the retainers and cement inside the pipe are drilled out. Occasionally a multiple batch operation is required to obtain the desired results.

Squeeze cementing as a method for reducing gas-oil ratios and excluding water has been definitely proved in many areas. In other areas, it has not been so successful. It should be remembered that permanent exclusion of free gas or water cannot be expected in any reservoir if there is to be future change in the gas-oil or oil-water contacts. The removal of oil from a reservoir will change the position of the gas-oil and oil-water contacts. As these changes take place, water or gas may reappear in a well that has been squeezed. However, such a recurrence will not necessarily condemn earlier squeeze jobs. Additional squeezing, or similar remedial work, may be required in order to promote the most efficient recovery of oil.

Reference

Torrey, Paul D., "Selective Exclusion of Fluids From Wells," Drilling and Production Practice for 1939, A.P.I., pp. 205-251.

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

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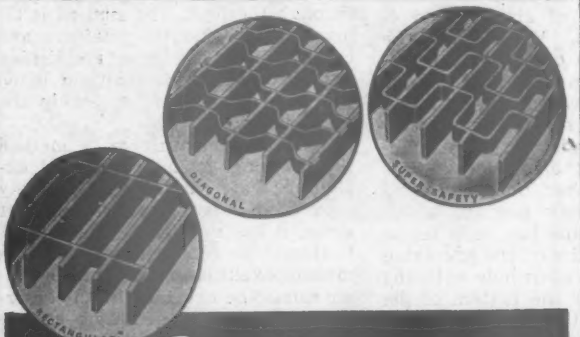

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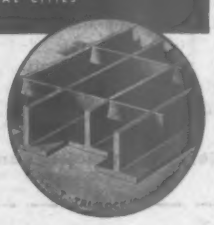

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PRACTICAL REFINERY ENGINEERING

No. 10—Shell-Side Film Coefficients

by Paul Buthod and B. W. Whiteley

IN commercial heat exchangers, the total resistance to the flow of heat consists of the metal-wall resistance and the fluid resistances both on the tube side and shell side. Of these factors, the metal-wall and tube-side resistances can be determined rather simply. The shell-side fluid resistance, however, presents several complicating factors, not the least of these being determination of the true average mass velocity.

Considerable investigation has been conducted along these lines,[1,2] and an equation of the type:

$$(1) \qquad h = JcG \div \left(\frac{cz}{k}\right)^{0.667}$$

where the symbols are explained in the accompanying notation, has been found to satisfactorily correlate data on commercial heat exchangers.[3] For practical application, the factor "J" can be determined from a plot of test data which cover a wide range of actual installations.[3]

The mass velocity term "G" takes into consideration any leakage past the baffles. For a single-pass shell, the mass velocity can be calculated from the following equation:

$$(2) \qquad G = \frac{W}{b(d_s - 1.128\, d_t N^{0.5}) + Y d_s N^{1.25}}$$

For a two-pass shell, the right-hand side of the above equation should be multiplied by a factor of 1.67. The quantity "Y" is a leakage factor which for commercial installations is approximately equal to 0.01.

To facilitate calculation of the heat-transfer film coefficient, the accompanying charts may be used. Referring to the notation on these charts, the mass velocity for a single-pass shell is:

$$G = W \div (A_1 - A_2 + A_3)$$

and for a two-pass shell is:

$$G = 1.67\ W \div (A_1 - A_2 + A_3)$$

The values of A_1, A_2 and A_3 are read directly from the chart (Fig. 1). To determine the thermal resistance, or film coefficient on the shell side, it is necessary to know the mass velocity, viscosity, tube outside diameter, and A.P.I. gravity of the oil.

This chart is applicable to exchangers with staggered tubes. If the tubes are in line, the value of the thermal resistance obtained from the chart should be multiplied by a factor of 1.18 (multiply the heat-transfer film coefficient by 0.85).

It will be noted that the chart can be used for any petroleum liquid. If water is used on the shell side of the heat exchanger, the approximate thermal resistance can be obtained by disregarding the diagonal gravity-correction lines on the chart, reading "R" directly on the top scale and multiplying the value so obtained by 0.393.

The use of the charts is illustrated by the following examples:

Example 1.—Pure absorption oil coming from a stripping column is to be cooled from 250° to 150° F. 10,000 lb./hr. of absorption oil are handled, the A.P.I. gravity being 36°, and the viscosity at the average temperature of 200° F. being 2 centipoises. The heat exchanger is designed with a single-pass 8-in. shell, 44 tubes (⅝-in. o.d.) and 2-in. baffle spacing. Calculate the mass velocity and heat-transfer film coefficient of the absorption oil on the shell side of the heat exchanger.

Solution.—Determining the mass velocity from the accompanying chart:

$$G = 10{,}000 \div (A_1 - A_2 + A_3)$$

Enter the bottom of the left portion of the chart at a baffle spacing of 2-in. Rise vertically to a shell inside diameter of 8-in., then move horizontally and read $A_1 = 0.111$ on the left-hand scale.

Starting again at a baffle spacing of 2-in., rise vertically to a tube outside diameter of ⅝-in. (0.625-in.), then move horizontally to a line for 44 tubes. From this point rise vertically and read $A_3 = 0.066$ on the top scale. (Note that A_3 is a reciprocal scale, i.e., increases from right to left.)

To determine A_2, use the right-hand portion of the chart. Starting at a tube outside diameter of 0.625-in., rise vertically to a line for 44 tubes and read $A_2 = 0.059$ on the right-hand scale.

The mass velocity is:

$$G = 10{,}000 \div (0.111 - 0.066 + 0.059) = 96{,}100 \text{ lb./hr.-sq. ft.}$$

Using the chart for "Heat Transfer Film Coefficient—Shell Side of Commercial Heat Exchangers," (Fig. 2) start on the bottom scale at a mass velocity of 96,100. From this point rise vertically to a viscosity line of 2 centipoises, then move horizontally to a tube outside diameter of 0.625-in. From this point, rise vertically to an A.P.I. gravity of 36°, then move parallel to the diagonal guide lines and read R = 0.0094 on the top scale.

The heat-transfer film coefficient is:

$$h = 1/R = 1/0.0094 = 106 \text{ B.t.u./hr.-sq. ft.-°F.}$$

Example 2.—A 35° A.P.I. crude-oil charge to a tube still is used to cool a 40° A.P.I. kerosene product. The crude-oil rate is 5,000 bbl. per day and the kerosene is flowing at the rate of 1,000 bbl. per day. A heat balance gives the following data:

Temp. crude in—60° F.
Temp. crude out—132° F.
Temp. kerosene in—400° F.
Temp. kerosene out—100° F.
Heat transferred—2,110,000 B.t.u./hr.

The average viscosities are crude oil, 3.0 centipoises; and kerosene, 0.6 centipoises. A tubular heat exchanger is to be used with the kerosene flowing through the shell and the crude oil through the tubes. The exchanger is to be made with a shell inside diameter of 10 in., a tube bundle of 76 tubes (⅝-in. o.d., 16-gage brass), and a baffle spacing of 4 in. If the exchangers are available in 12-ft. lengths, determine the required number of exchangers.

Solution.—The total resistance to the flow of heat consists of the individual resistances of the metal tube wall, and the tube-side and shell-side fluid films.

(a) Tube-wall resistance.—The metal-wall resistance corrected to the outside tube diameter is $R_1 = 0.000112$.

(b) Tube-side film resistance.—The quantity of crude oil handled by an individual tube is:

$$5{,}000 \div 44 = 65.7 \text{ bbl. per day}$$

and the mass velocity corresponding

(Continued on page 132)

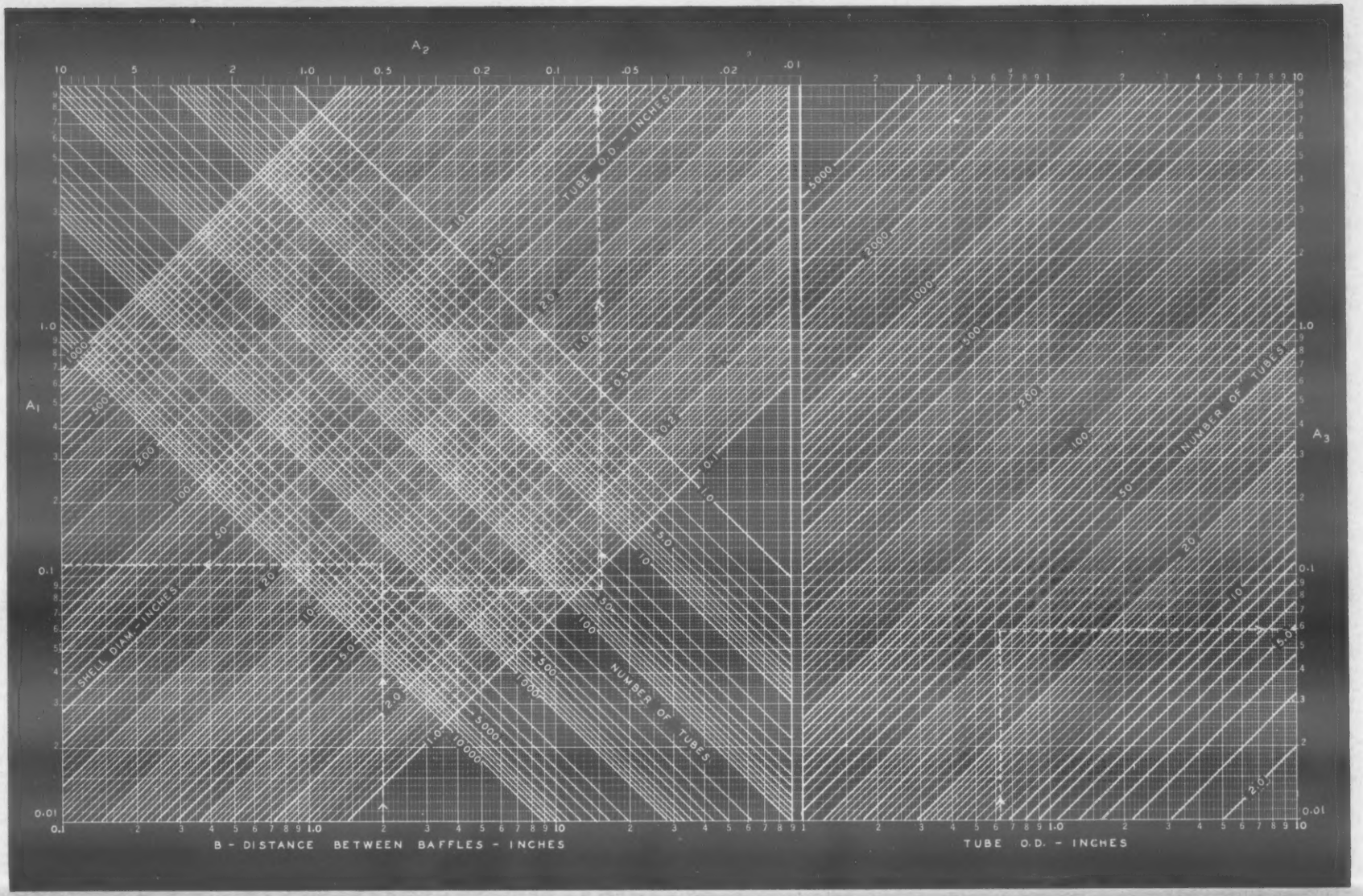
A2
A1
A3
SHELL DIAM. - INCHES
TUBE O.D. - INCHES
NUMBER OF TUBES
B - DISTANCE BETWEEN BAFFLES - INCHES
TUBE O.D. - INCHES

Fig. 1

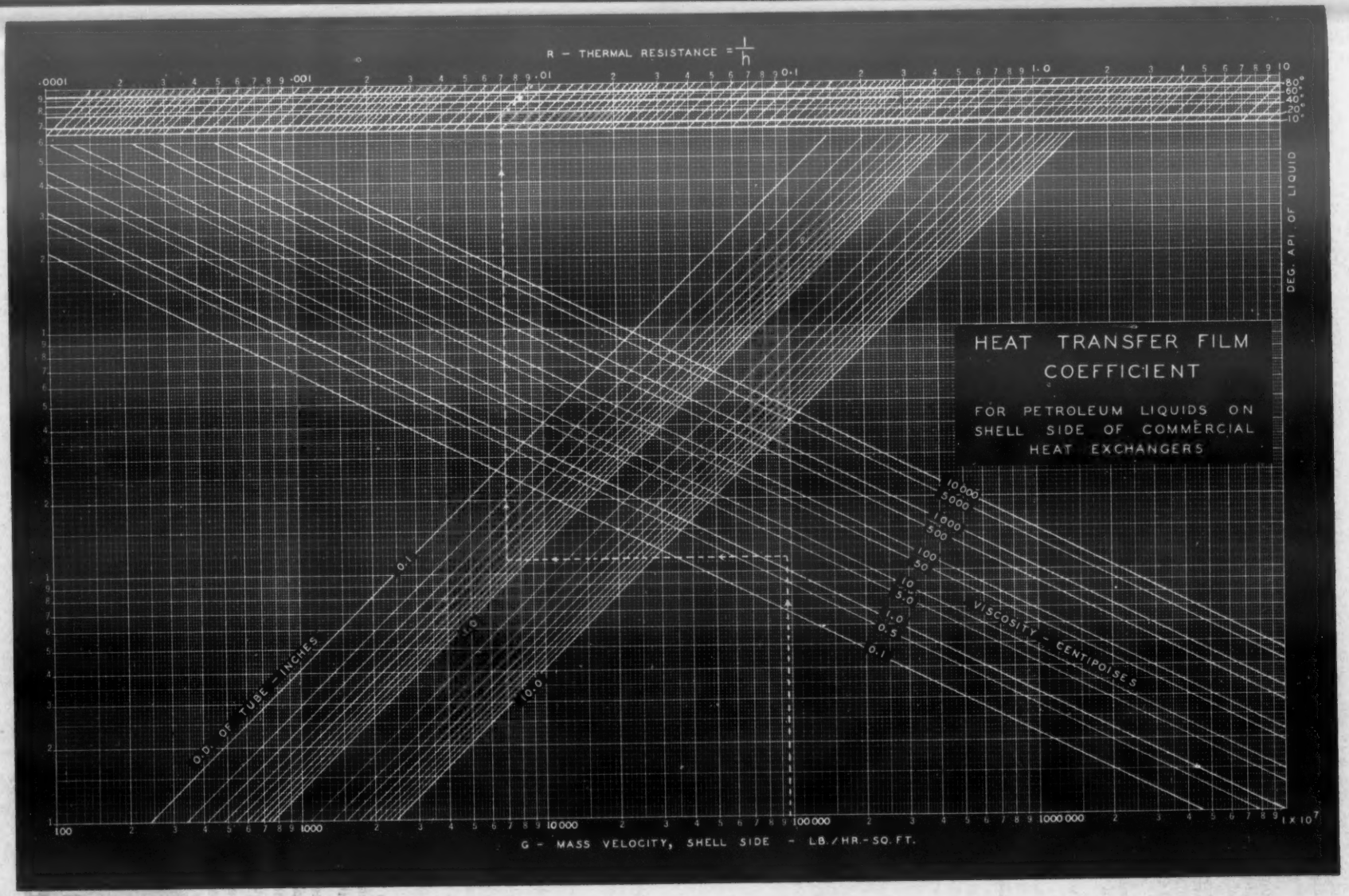
R – THERMAL RESISTANCE = 1/h
.0001
.001
.01
0.1
1.0
10
DEG. API OF LIQUID
80°
60°
40°
20°
10°
HEAT TRANSFER FILM COEFFICIENT
FOR PETROLEUM LIQUIDS ON SHELL SIDE OF COMMERCIAL HEAT EXCHANGERS
10 000
5000
1 000
500
100
50
10
5.0
1.0
0.5
0.1
VISCOSITY – CENTIPOISES
O.D. OF TUBE – INCHES
0.1
0.5
1.0
10.0
100
1000
10 000
100 000
1 000 000
X 10⁷
G – MASS VELOCITY, SHELL SIDE – LB./HR.-SQ.FT.

Fig. 2

to this rate of flow and a tube inside diameter of 0.495-in. is 640,000 lb./hr.-sq. ft.

The thermal resistance corresponding to this rate of flow, a tube inside diameter of 0.495-in., viscosity of 3.0 centipoises, and A.P.I. gravity of 35° is found to be R = 0.0088, which corrected to the outside tube diameter is $R_o = 0.0088 \times 0.625 \div 0.495 = 0.0111$.

(c) Shell-side resistance — Determining the mass velocity by means of the accompanying chart:

$A_1 = 0.28$, $A_2 = 0.173$ and $A_3 = 0.115$.

$$G = 12{,}100 \div 0.222 = 54{,}500 \text{ lb./hr.-sq. ft.}$$

Using the accompanying chart for determining the shell-side thermal resistance for a mass velocity of 54,500, a viscosity of 0.65 centipoises, a tube outside diameter of 0.625-in. and an A.P.I. gravity of 40°, the thermal resistance is found to be $R_s = 0.0097$.

The total resistance is:

$$R_t = 0.0097 + 0.0111 + 0.0001 = 0.0209$$

and the over-all coefficient is:

$$U = 1/R_t = 1/0.0209 = 47.9 \text{ B.t.u./hr.-sq. ft.-°F.}$$

The true mean temperature difference is:

$$\Delta t = 120° \text{ F.}$$

The necessary area for heat transfer is:

$$A = q/U\,\Delta t = 2{,}110{,}000 \div 47.9 \times 120 = 368 \text{ sq. ft.}$$

From the table of condenser tubes, 6.11 ft. of ⅝-in. o.d. tube is equivalent to 1 sq. ft. and since there are 76 tubes in the bundle, the total length of the required exchangers in series is:

$$L = 368 \times 6.11 \div 76 = 29.6 \text{ ft.}$$

Three 12-ft. heat exchangers in series, then will be required.

Acknowledgment

The authors wish to acknowledge the assistance of V. O. Marshall who furnished considerable data on the design of commercial heat exchangers.

Notation:

- q = amount of heat transfer, B.t.u./hr.
- U = over-all coefficient of heat transfer, B.t.u./hr.-sq. ft.-°F.
- Δt = true mean temperature difference, °F.
- h = film coefficient, B.t.u./hr.-sq. ft.-°F.
- R_s, R_o, R_s = thermal resistance = 1/h
- c = specific heat of fluid, B.t.u./lb.-°F.
- z = viscosity, lb./ft.-hr.
- k = thermal conductivity, B.t.u./hr.-ft.-°F.
- G = mass velocity on shell side, lb./hr.-sq. ft.
- J = factor in heat-transfer equation, dimensionless
- b = baffle spacing, ft.
- B = baffle spacing, in.
- d_s = internal diameter of shell, ft.
- d_t = outside diameter of tubes, ft.
- N = total number of tubes in exchanger
- Y = leakage factor (—0.01)
- W = rate of flow, lb./hr.
- A_1, A_2, A_3 — see accompanying chart.

References

1. Colburn, A. P., "A Method of Correlating Forced Convection Heat Transfer Data and a Comparison With Fluid Friction," Trans. A.I.C.E. 29, 174, 1933.
2. Bowman, R. A., "Investigation of Heat Transfer Rates on the External Surface of Baffled Tube Tanks." Paper presented at annual meeting A.S.M.E. at New York, 1934.
3. Marshall, V. O., personal communications.

M. J. Gavin and **J. G. Detwiler** have been named assistant directors of the foreign refining division of Petroleum Administration for War. Gavin, whose duties will relate to facilities, joined PAW as a foreign petroleum specialist in 1942. Detwiler joined the organization last February as a petroleum technologist.

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To the operator, the JERGUSON Liquid-Level Gage shows the height of a tank's contents, entirely independent of recording or indicating meter readings located elsewhere. He should have that "on the spot" reading.

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Natural Gas

Institute of Gas Technology To Have New Laboratory

CHICAGO. — A new gasification research laboratory being built for the Institute of Gas Technology at Illinois Institute of Technology will add 30 per cent to the space available for gas-industry research. It will be ready September 1. Though the structure will be used primarily for gasification research, a portion will be utilized as an addition to the Gas Institute library.

Constructed and equipped at an approximate cost of $10,000, the new laboratory bridges the space between the two present buildings of the Gas Institute, making one unit of the entire institute. The new building is a one-story brick structure. Its 1,800 sq. ft. of space will accommodate 20 research workers.

Kansas-Nebraska Natural Plans Bigger Line

WASHINGTON. — Federal Power Commission held a hearing August 18 on an application filed by Kansas-Nebraska Natural Gas Co., Inc., Phillipsburg, Kans., for permission to construct and operate 16 miles of 12¾-in. pipe line extending northwardly from its compressor station near Stockton in Rooks County, Kansas, along the route of the company's existing 6⅝-in. line, and to remove and abandon the latter line.

SEC Issues Its Opinion on Columbia Reorganization

PHILADELPHIA.—Securities and Exchange Commission has issued a memorandum opinion giving its tentative conclusions regarding reorganization of Columbia Gas & Electric Corp. The opinion was issued at Columbia's request. A hearing will be held September 11.

Gas utility operations and other businesses which may be retained under geographic integration provisions of the Holding Company Act as constituting "one or more single integrated public utility systems and businesses reasonably incidental or economically necessary," include Bracken County(Ky.) Gas Co., Central Kentucky Natural Gas Co., Cincinnati Gas Transportation Co., Columbia Engineering Corp., New York; Cumberland & Allegheny Gas Co., Pittsburgh; Fayette County (Pa.) Gas Co., Gettysburg (Pa.) Gas Corp., Greensboro (Pa.) Gas Co. and Manufacturers Light & Heat Co., Pittsburgh; Natural Gas Co. of West Virginia, Ohio Fuel Gas Co., Columbus; Pennsylvania Fuel Gas Co., Pittsburgh; Point Pleasant (W. Va.) Natural Gas Co., Preston Oil Co., Columbus; Union Gasoline & Oil Corp., United Fuel Gas Co., Viking Distributing Co., Virginian Gasoline & Oil Co. and Warfield Natural Gas Co., all of Charleston, W. Va.

Columbia could not retain, along with the previously named subsidiaries, any interest in the following companies:

American Water Works & Electric Co., New York; Argo Oil Corp., Bridge Gas Co., Cincinnati Gas & Electric Co., Cincinnati, Newport & Covington Railway Co., Columbia Corp., Dayton Power & Light Co., Dixie Traction Co. and Licking River Bridge Co., Cincinnati; Miami Development Co., Columbus; Miami Power Corp., Cincinnati; Servel, Inc.; Ohio Fuel Supply Co., Columbus; Union Light, Heat & Power Co., Covington, Ky.; West Harrison (Ind.) Electric & Water Co., Inc.; Wood Coal Co.; Wooster (Ohio) Tool & Supply Co. and United Corp., parent of Columbia.

A.G.A. Votes to Cancel Its Annual Convention

Sufficient mail votes have been received from members of the executive board to make it certain that the annual convention of the American Gas Association for 1944 will be canceled. Facilities at the Stevens in Chicago have been released. In compliance with the constitution of the association and with the membership corporation laws of New York, an annual meeting will be held without speaking program and for the transaction of routine business. The time and place for the annual meeting will be decided by the executive board at its meeting in New York, September 13.

Natural Gasoline

New Record Established in Natural-Gasoline Output

WASHINGTON. — Daily average production of natural gasoline and allied products in June established a new high of 11,462,000 gal., compared with 11,214,000 gal. in May, and with 9,873,000 gal. in June 1943. Louisiana registered the biggest gain. Texas and California increased their output materially, but little change was indicated in most of the states.

PRODUCTION
(Thousands of gallons)

	June	May
Natural gasoline	182,658	186,186
Cycle products	75,180	72,870
Liquefied petroleum gases:		
Isobutane*	15,666	15,666
Other L.P.G.*	70,350	72,912
Liquefied refinery gas	10,080	12,222
Benzol	8,400	8,400
Total production	362,334	368,256

*At natural-gasoline and cycle plants.

Total stocks of 188,034,000 gal. on June 30 represented a rise of 1,722,000 gal. during the month. Decrease in stocks at plants was more than offset by increase at refineries. Output of cycle products showed the highest ratio increase of the light products. This was reflected in the demand for cycle condensate used at refineries.

Texas Expected to Produce 48 Per Cent of Natural

DALLAS. — Texas production of natural gasoline in 1944 will total 1,900,000,000 gal., or 48 per cent of the nation's expected output of 3,960,000,000 gal., according to the estimate of Texas Mid-Continent Oil and Gas Association.

In 1943 Texas produced 1,670,000,000 gal., or 45 per cent of the nation's run of 3,703,000,000 gal. In 1942, the year this country entered the war, Texas produced 1,567,830,000 gal. contrasted with 1,182,872,000 gal. in 1941. The United States produced 2,696,568,000 gal. in 1941, compared with 3,499,524,000 in 1942.

Texas has 136 natural-gasoline plants and 3 cycling plants which also produce petroleum liquids. These plants are widely distributed. The gasoline plants have a combined daily capacity of about 4,360,000 gal. The cycling plants have a daily liquid capacity of 3,600,000 gal. The productivity in both groups of plants is being increased by additions and new construction.

REFINING

Big Fractionating Tower Shipped in One Piece

A fractionating tower 13½ by 150 ft. and weighing 250 tons, the biggest ever shipped in one piece, moved out of the Tulsa Boiler & Machinery Co. plant in West Tulsa last week, on its way to an unrevealed destination, where it is to be used in making butadiene for synthetic rubber. This huge pressure tank is one of two ordered by the same refinery.

The 150 ft. of tank was shipped on three special railroad flatcars equipped with heavy cradles. The weight was supported by pivots on the two end cars, the third car running between as an idler.

Because the tank itself is 13½ ft. in diameter, it was necessary to use a railroad route which would give sufficient clearance for the tank plus the height of the car — a total of nearly 20 ft. In many sections of the country bridges or tunnels would be too small to permit passage.

Officials of the Tulsa Boiler & Machinery Co. said that though larger fractionating towers have been built, none has ever been shipped in one piece. The parts have been assembled at the refinery site.

Before the tower was shipped it was tested for leaks and strength under heavy hydrostatic pressure. When full of water, it weighed just under 2,000,000 lb. Its walls were rolled from 1⅛-in. steel.

Can and Drum Plants Set Up in War Theaters

WASHINGTON.—Most of the oil products now sent overseas for war use are moved in tankers because of the big saving effected by bulk shipments, and the Quartermaster Corps has installed can and drum manufacturing plants in theaters of operation throughout the world. Early in the war millions of gallons of oil products were shipped in 5-gal. and 55-gal. containers. After the Sicilian invasion, when tankers could be brought to a short distance offshore and their cargoes of gasoline, other fuels, and lubricants pumped into portable tanks, the Army decided the use of "blitz" cans was wasteful, and tanker shipments were substituted.

Many types and sizes of petroleum containers are being manufactured in the newly established overseas plants. Some produce 55-gal. drums; others 42-gal. barrels (36 imperial gallons, a size popular with the British); round 5-gal. cans, 5-gal. flat "blitz" cans, and others.

The plants operated by the Army utilize native labor wherever possible and whenever such labor is available. Few soldiers are used. However, since native labor is not always available, the Quartermaster Corps has set up the Quartermaster Large Drum Manufacturing Co. to operate can and drum plants wherever necessary.

Two Refineries to Be Built By Petroleos Mexicanos

MEXICO CITY.—Petroleos Mexicanos, government-operated oil company, has announced that it soon will make public the type of material it acquired in the United States for two new oil refineries. The equipment is valued at $10,000,000.

The refineries are to be at Poza Rica, Veracruz and at Atzcapotzalco, near here. The latter will produce high-octane aviation gasoline.

Nonpetroleum Fuel Study Urged by R E. Wilson

NEW YORK.—Cooperation of the Government and the oil industry in a long-range exploration of nonpetroleum sources of liquid fuel is demanded by the national interest, Dr. Robert E. Wilson, president of Pan American Petroleum & Transport Co., declares in a report to American Chemical Society. Petroleum supplies probably will be adequate for several decades, said Doctor Wilson, but he added:

"It would be foolhardy not to get started on a substantial program well in advance of any certainty as to the need therefor."

Government research would be particularly important, he said, in the event that increased importation of relatively cheap foreign crudes kept domestic crude prices low. In that case, "industry research on substitute sources would tend to lag and a government-supported program would be more necessary" than if

PIPE LINES

Pipe Line to Carry Oil Into China for War Operations

WASHINGTON. — A pipe line built by American Army engineers is expected to move oil into China for use in war operations against the Japanese, according to fragmentary information obtainable here. The pipe line, viewed as part of the protracted China-Burma campaign, should provide liberal supplies of fuel for General Chenault's air force. The precise location of the line is not divulged.

The value of the line in prosecution of the Allied offensive is clear. Upon its completion it no longer will be necessary for big aerial transports to move fuel over the Himalaya Mountains to keep Chenault's fliers in action. He will be able to use more planes and to send them farther and more frequently.

Military observers here have known for months that the project was under way, but details about it have been kept secret. It is disclosed now, however, that Army engineers surveyed the course and supervised construction.

The pipe line is regarded as a logical development of a campaign which began with the building of the Burma Road and continued with that of the new Lido Road, after the Jap invaders severed the original route. The new project was planned to lessen the burden on the airborne Burma Road, which has been in service while the Lido Highway was being pushed through the Burma jungle in the wake of Stillwell's invading forces.

Neither the original land route nor the aerial substitute was wholly satisfactory because of the quantity of gasoline burned by tanks and planes carrying fuel to the interior.

Demands Congress Consent To Big-Inch Changeover

WASHINGTON.—Rep. Francis E. Walter announced last week that he would introduce an amendment to the surplus-property disposal bill now before the House to prevent postwar changeover of the big-inch pipe line from oil to natural gas without the consent of Congress. Walter said that the committee on executive expenditures had agreed to his proposal and would sponsor the amendment.

In remarks inserted in the Congressional Record, Walter declared that Sidney S. Swensrud, vice president, Standard Oil Co. (Ohio), recently proposed the postwar changeover of the two WEP lines, contending that tankers again would take over the petroleum transportation business and that natural gas could be delivered and sold more cheaply than manufactured gas and other fuel now utilized in the New York-New Jersey-Philadelphia area.

"Since gas is 'laborless' to a degree that exceeds any other fuel, it is obvious that coal cannot compete in this market against natural gas at low cost," he said.

"A postwar destruction of the primary markets of anthracite would be accompanied, undoubtedly, by the loss of many thousands of jobs for miners, the bankruptcy of many mining companies and the destruction of invaluable natural resources."

Government expenditure on the pipe lines has totaled $165,000,000 and while at first blush it may seem economically justified to utilize these facilities after the war, the conversion effect on the anthracite industry, as well as bituminous coal, would cost the government many times that amount, Walter said, in relief and rehabilitation cost.

In this connection he recalled that public assistance expenditures in the anthracite region during the 10-year period 1933-1942 approached "one-third of a billion dollars."

Converting the pipe lines to gas, he declared, would be "tantamount to subsidizing a laborless fuel in or-

NEW MAPS
Colorado, Wyoming and Montana

State maps showing oil fields in green, gas fields in red, with index giving official field names and location of fields by township and range.
Shows crude oil pipe lines and natural gas pipe lines with size of lines.
Also shows location of operating refineries with crude oil capacity in barrels per day.
Maps are on a scale 1" = 8 miles and show cities, towns, townships and ranges.
Prices: Blue line on cloth:

Colorado	Size 42"x50"	$15.00
Wyoming	Size 42"x50"	$17.50
Montana	Size 42"x60"	$15.00

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der to destroy the anthracite industry whose cost is roughly 70 per cent labor." The conversion, he added, would constitute "a specific defeat of the nation's effort to secure maximum employment in the postwar period."

Citing statistics that there is an approximate 30-year natural gas supply but sufficient bituminous coal reserves to last 3,800 years and anthracite 175 years, at present rates of production and consumption, Walter said it was necessary to conserve the gas supply for making synthetic gasoline and other chemical use.

The "nation should be alert," he declared, to the employment threat of the proposed pipe-line conversion to the railroad and fuel industries, as well as to mining, particularly at this time "when postwar employment is a matter of grave concern to the nation."

Pipe Lines Will "Pull World Together," Says Stark

MIAMI, Fla. — International pipe lines "will one day prove bonds to pull the world together more firmly in international cooperation," according to Charles Stark, vice president of Phillips Petroleum Co.

"No longer does the Texan or Oklahoman think that oil sprouts only in his back yard," Stark remarked as he boarded a Pan American clipper for a flight to La Guaria, Venezuela.

PAW Considering Need for New West Edmond Line

CHICAGO.—The question of recommending additional pipe-line capacity for the West Edmond field in Oklahoma was taken under advisement here last week by representatives of the Petroleum Administration for War. W. W. Vandeveer, director in charge of PAW District 2, presided at a hearing August 18 at which representatives of producing and pipe-line companies expressed their views.

There was general agreement that continuation of the present rate of production would require additional facilities. However, representatives of Champlin Refining Co., owner of Cimarron Valley Pipe Line Co., the only line now serving the field, felt this status was too far in the future to justify present action and said the existing line was adequate until the middle of 1945.

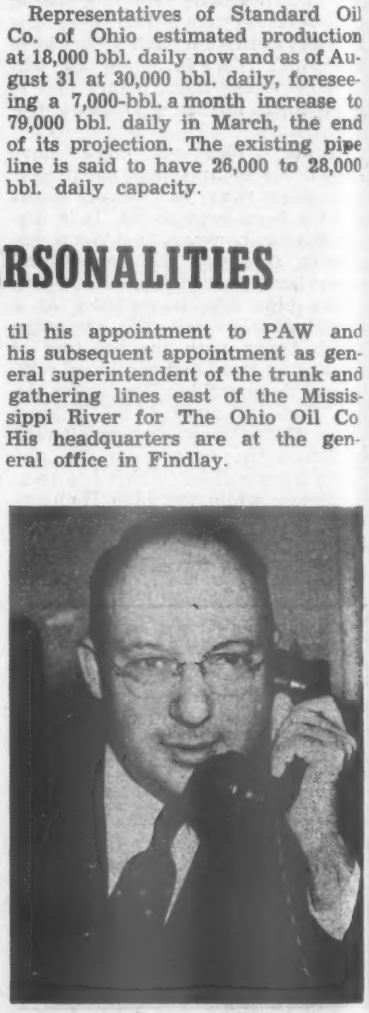
Representatives of Standard Oil Co. of Ohio estimated production at 18,000 bbl. daily now and as of August 31 at 30,000 bbl. daily, foreseeing a 7,000-bbl. a month increase to 79,000 bbl. daily in March, the end of its projection. The existing pipe line is said to have 26,000 to 28,000 bbl. daily capacity.

PIPE-LINE PERSONALITIES

AFTER 9 months with the Petroleum Administration for War in Washington, Fred H. Warren has returned to The Ohio Oil Co. in Findlay, Ohio, to assume new duties as general superintendent of trunk and gathering lines east of the Mississippi River in the pipe-line department. During his leave of absence from the company, Warren served in the pipe-line engineering section of the supply and transportation division of PAW primarily in a consulting capacity.

Warren was born and reared on a farm in Mills County, Iowa. Upon receiving his engineering degree from Iowa State College in 1925, his first position was with Ingersoll-Rand Co. where he received training as a pump and engine specialist. He was located in the company's Detroit and Cleveland offices where he acquired the background for his selected field. In 1934 he was sent to Indianapolis as sales engineer, his territory including Indiana and a part of Ohio.

Warren was appointed assistant chief engineer in the pipe-line department of The Ohio Oil Co. in June 1939. He held this position until his appointment to PAW and his subsequent appointment as general superintendent of the trunk and gathering lines east of the Mississippi River for The Ohio Oil Co. His headquarters are at the general office in Findlay.



Exploration and Drilling

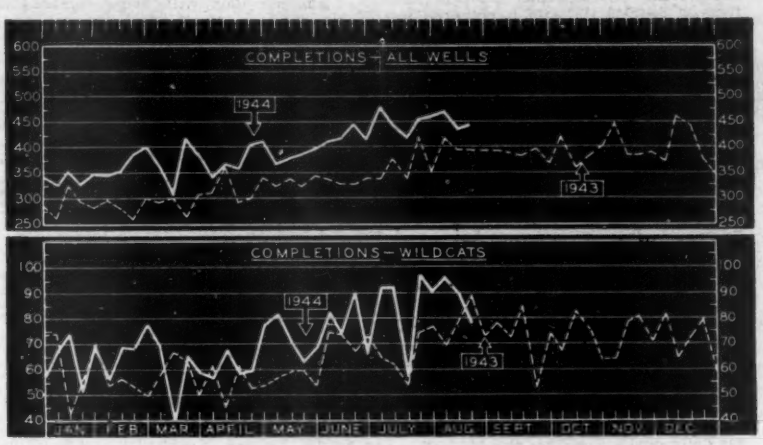
Week's Highlights

THE discovery of oil in a pay tentatively identified by the paleontologists as Devonian, by Mid-Continent Petroleum Corp. 1-7 University, a wildcat in Section 20, Block 13, Andrews County, Texas, about 2 miles south of the Fullerton pool, has added considerable fuel to the flame of renewed geological thinking about the Permian Basin area of West Texas and New Mexico.

The new discovery seems to be quite substantial, the electric log indicating fairly uniform good porosity of 180 ft. thickness at 8,470-8,650 ft., and casing perforated through 120 ft. of this at 8,480-8,600 ft. Casing was set at 8,941 ft., cement plug drilled out to 8,750 ft., with 2½-in. tubing run to that point, tubing perforated at 8,597-8,600 ft., and the well washed in with 1,000 gal. of acid. It then flowed 135 bbl. and 150 bbl. of 40° oil in the first and second hours respectively, through a ¾-in. tubing choke.

The test was drilled on seismograph work and is said to have run structurally high on the Permian and still higher on the Devonian, but is not believed to have reached the Ellenburger of Ordovician age. Two shallow shows were reported in the Permian. These data indicate intensification of folding with depth and that the Devonian production will underlie less surface area than the Permian structure. Some geologists believe that the Ellenburger, if found productive, might prove to underlie a larger surface area than the Devonian, on the theory that the Ordovician structure below the unconformity might broaden out.

Since it is now evident that structure in the deeper beds does not always coincide with the upper Permian structures, renewed geophysical activity on an even larger scale than at present is a probability for this area, sharpshooting for structure in specific potential producing horizons below the Permian. Incidentally, the term Permian Basin is gradually becoming a misnomer for this area in so far as it indicates the oil-producing horizons. With this addition of Devonian production, the geologic section is now complete, in that oil has been found in Permian, Pennsylvanian, Devonian, Silurian, Ordovician and even Cambrian formations.



Solid line charts current weekly completions

COMPLETIONS IN ALL FIELDS . . .

Week ended August 19, 1944

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1944	1943
N. Y., Penna., W. Va.*	52	17	3	72	185,204	2,076	2,137
Ohio	3	8	6	17	41,870	603	547
Indiana	2	0	3	5	10,260	140	140
Kentucky	2	1	4	7	14,790	433	239
Illinois	27	0	21	48	128,611	1,152	1,094
Michigan	5	3	7	15	40,436	393	354
Kansas	21	1	17	39	133,842	1,111	1,017
Nebraska, Missouri, Iowa	0	0	0	0	0	21	30
Oklahoma	16	2	13	31	106,733	1,064	723
Texas							
North Central	11	0	17	28	102,095	901	883
West	23	0	6	29	127,117	942	536
Panhandle	9	2	1	12	36,793	142	116
Eastern	1	0	3	4	25,717	206	178
Gulf Coast	19	2	15	36	240,603	745	279
Southwest	3	3	7	13	63,388	456	568
Total Texas	66	7	49	122	595,713	3,392	2,560
Louisiana							
Northern	4	4	0	8	17,807	187	199
Southern	7	0	4	11	91,971	305	233
Total Louisiana	11	4	4	19	109,778	492	432
Arkansas	3	0	2	5	22,916	141	154
Mississippi	1	0	2	3	19,081	84	57
Southeastern States	0	0	2	2	12,218	23	†
Montana	3	0	2	5	9,557	203	136
Wyoming	4	0	1	5	26,837	103	81
Colorado-Utah	1	0	0	1	7,019	20	18
New Mexico	1	0	2	3	11,928	242	131
California	41	2	4	47	173,687	1,243	825
Total United States	259	45	142	446	1,650,480	12,936	10,675
Total previous week	252	47	134	433			
Total Aug. 2, 1943	227	30	130	387			

*Does not include 49 pressure wells. †Included in total shown for Mississippi.

TEXAS GULF COAST

New Sand Opened in Needville Pool

HOUSTON.—A new sand in the Needville pool, Ford Bend County, has been opened by W. L. Goldston et al 1 E. C. Farmer, Robert Hodge Survey, 2½ miles south of Needville, from perforations at 6,445-49 ft., with a potential test of 77 bbl. per day through 3/32-in. choke, gravity 39.5°, no water, gas-oil ratio 490 to 1, tubing pressure 800 lb. Total depth is 6,706 ft., with top of sand at 6,445 ft. This well was originally completed as a gas well in perforations from 5,193-96 ft.

British American Oil Producing Co. 1 Ed Hurta et al, in Robert Hodge Survey, Needville pool, Fort Bend County, west extension test and discovery well of gas-condensate production at 6,547-52 ft., is showing possible oil production in a sand just below 6,000 ft. On recent test in perforations from 6,026-32 ft. it flowed at the rate of 97 bbl. of oil per day on ⅛-in. choke, tubing pressure 625 lb., gas-oil ratio 350 to 1.

An extension well to Jackson Pasture field in Chambers County, Sun Oil Co. 1 J. E. Jackson, in S. Barrow Survey, Abstract 46, about ½ mile southwest of the discovery well, has been gaged and shows open flow potential of 100,000,000 cu. ft. of gas per day, flowed 4,138,000 cu. ft. of gas daily on ¼-in. choke, and 1,011,000 cu. ft. of gas day on ⅛-in. choke with considerable condensate, 57.8° gravity. Gas-oil ratio is 32,700 to 1. Flow was from perforations at 8,075-95 ft., with casing set at 8,070 ft.

East extension at Hitchcock field, Galveston County, Stewarts 14 fee, in James Spillman Survey, was recompleted in the field pay after Glenn McCarthy had drilled it to 12,585 ft. and failed to find production at deeper levels. Recompletion potential shows flow of 66.16 bbl. a day on 7/64-in. choke, tubing pressure 480 lb., gas-oil ratio 392 to 1, gravity 29.3°, 20 per cent water, top of sand at 5,131 ft., 40 perforations from 5,139-46 ft.

A new Wilcox well on the west side of Wilcox sector of the Livingston field, Polk County, Humble Oil & Refining Co. 33 Granbury et al, was completed flowing 400.82 bbl. per day on ¼-in. choke, tubing pressure 500 lb., casing pressure 1,300 lb., gas-oil ratio 479 to 1, gravity 36.4, 0.1 per cent water. Total depth is 7,090 ft., plugged-back total depth 7,050 ft., 5½-in. set at 7,078 ft. and perforated for completion in sand topped at 6,997 ft.

In the Lissie area, Wharton County, Edwin Nielsen et al 1 Winnie Poole, in GH&H Survey 25, Abstract 156, is reported to have shown about 4,000,000 cu. ft. of gas per day, with some condensate, through ¼-in. choke on a recent test. Tubing pressure 2,220 lb. and casing pressure 2,300 lb. Total depth is 7,204 ft.

UPPER GULF COAST WILDCAT COMPLETIONS

Colorado County: Superior Oil 1-A Mrs. Matilda Tait, Patrick Daugherty Sur., Abst. 167, 1 mi. NW of Altair, dry, TD 9,100 ft.

Grimes County: Moore & Ahern 1 H. A. Bennett, A. Brown Survey, 2 mi. E of Anderson, dry, TD 5,549 ft.

SOUTH LOUISIANA

Humble Get Shallow Showing in Potash Field

NEW ORLEANS.—Shallow oil showing has been encountered at 1,900-ft. level by Humble Oil & Refining Co. 66 Orleans Levee Board, Section 12-18s-15e, at Potash field in Plaquemines Parish. This test apparently ran into an oil sand after drilling plug in the surface casing. With 2½-in. tubing set at 1,794 ft., it is flowing at the rate of 3 bbl. per hour on 12/64-in. choke, tubing pressure 300 lb., gravity 17.8°. Total depth is 1,918 ft. with 10¾-in. set at 1,850 ft. This was originally a scheduled 9,000-ft. test.

Pure Oil Co. 1 General American Transportation Corp., located in Section 7-12s-8e, at Good Hope in St. Charles Parish, shows drilled-out depth of 7,845 ft. and is preparing to perforate for testing. It is believed this will open oil production. Total depth is 10,171 ft. with 5½-in. casing set to 7,919 ft.

At Rosedale field in Iberville Parish, Sugarfield Oil Co. is testing 1 Legg, Section 107-7s-10e, in perforations at 10,002-09 ft., with no details yet available. Squeeze jobs were made at 9,995-10,009 ft. and 10,012-16 ft. before perforating for completion. Total depth is 10,264 ft. with 5½-in. casing set at 10,258 ft.

Claude Morgan et al 1 Irene Wettermark, wildcat, Section 24-5n-3w, Rapides Parish, has 10¾-in. surface pipe set at 600 ft. and is preparing to drill plug.

Superior Oil Co. of California 1-B Miami Corp., Section 29-14s-3w, workover and deepening job in the Pecan Lake field discovery well, Cameron Parish, is testing in perforations at 10,068-99 ft., regular pay. The hole was recently deepened from 10,883 ft. to new total depth of 12,000 ft. The 7-in. casing is set at 10,554 ft. A fishing job had developed at 12,000 ft.

SOUTHWEST TEXAS

Complete Discovery Well In Charlotte Field

CORPUS CHRISTI.—Humble Oil & Refining Co. 3 Pruitt et ux, discovery well of Charlotte field, Atascosa County, has been completed with a potential of 176 bbl. a day through 3/16-in. choke, gas-oil ratio 1,250 to 1, gravity 37.7°. Total depth 6,923 ft. and production is from the Edwards lime. Humble is reported rigging up at 1 A. M. Lockwood, 3,900 ft. west southwest of the discovery well.

Humble 2 Green, northeast extension test in Gregory area of San Patricio County, is testing through perforations from 8,508-10 ft. Total depth is 9,502 ft. with 5½-in. casing set at 8,595 ft., with top of cement now shown as 8,515 ft.

Stanolind Oil & Gas Co. is setting 7-in. casing in the 1 Annie Lee Lyons, in A. W. Bass Survey, 2,721 ft. east of Stanolind 1 Spielhagen, gas well in the Burnell area of Karnes County. Total depth is 6,838 ft. Drill-stem test run at 6,830-38 ft., using ¼-in. and ⅜-in. chokes, showed 51 lb. working pressure, recovered 2,610 ft. of 36°-gravity oil and 630 ft. of oil and gas-cut mud in 25 minutes. Bottom-hole flowing pressure was 1,500 lb. with shut-in pressure 2,900 lb. Casing will probably be set at bottom of the hole.

Sun Oil Co. 1 D. J. Sullivan et al, Dan Sullivan field discovery well, in the northeastern part of Brooks County, flowed a potential of 147.66 bbl. a day through 6/64-in. choke, gas-oil ratio 333 to 1, tubing pressure 880 lb., casing pressure 2,260 lb., gravity 35.4°, no water, from 54 perforations from 8,508-17 ft. Total depth is 8,522 ft., top of sand 8,508 ft., with 2-in. set at 8,507 ft. The company has staked three new locations in the area: No. 3 Sullivan 1,866.8 ft. southwest, No. 4 Sullivan 1,866.8 ft. northeast, and No. 2 Sullivan is 2 miles southwest of the discovery.

SOUTHWEST TEXAS WILDCAT COMPLETIONS

Atascosa County: Humble 3 E. J. Pruitt et ux, Charlotte discovery, Antonio Estrada Survey, Abstract 224, southwest of Charlotte, TD 6,923 ft., no perforations, PT 176 bbl. day, 3/16-in. choke, gas-oil ratio 1,250 to 1, tubing pressure 710 lb., casing pressure 475 lb., gravity 37.7, 5 per cent water.

Bee County: Dirks Brothers 1-A D. E. Robinson, Section 6, Ragley subdivision, 3 mi. W of Tuleta, TD 3,938 ft., PT 38 bbl. day, gas lift, no water.

Herb E. Dirks et al 10 F. Goree, Thos. B. Barton Survey, 2¾ mi. southwest of Mineral, dry, TD 7,766 ft.

Brooks County: Texas 1 Mary M. Lass-

DAILY AVERAGE PRODUCTION FOR WEEK

	Aug. 19 crude oil	Distillate, allied products	August PAW quota all oils	Aug. 12 crude oil
Arkansas	80,600	4,500	82,500	81,000
California	860,400	51,100	917,100	852,750
Colorado	8,100	.....	7,900	8,150
Eastern	77,500	6,100	77,500	67,100
Illinois	206,700	11,500	226,500	209,700
Indiana	12,800	.....	14,000	12,950
Kansas	285,300	4,300	278,300	277,100
Kentucky	34,600	2,500	35,500	35,700
Louisiana	362,700	35,000	385,000	362,750
North Louisiana	73,750	.....	.....	73,800
South Louisiana	288,950	.....	.....	288,950
Michigan	49,400	400	51,400	49,400
Mississippi	45,750	.....	40,000	45,450
Montana	23,100	200	24,200	23,100
Nebraska	900	.....	1,000	900
New Mexico	105,800	5,500	115,500	108,400
Oklahoma	340,000	27,000	359,000	339,600
Texas	2,106,600	138,000	2,237,000	2,108,600
East Texas	371,700	.....	.....	371,700
East Central Texas	147,650	.....	.....	147,650
North Central Texas	148,750	.....	.....	148,750
Texas Panhandle	98,700	.....	.....	98,700
West Texas	484,950	.....	.....	484,950
So. Cent. Texas (San Antonio)	19,300	.....	.....	19,300
South Texas (Laredo)	77,400	.....	.....	77,400
Lower Gulf Coast	224,950	.....	.....	224,950
Upper Gulf Coast	535,200	.....	.....	535,200
Wyoming	84,200	3,000	103,000	83,450
Total United States	4,678,450	289,100	4,945,400	4,656,100
Total production January 1-August 19, 1944				1,040,742,600 bbl.
Same period last year				916,812,400 bbl.

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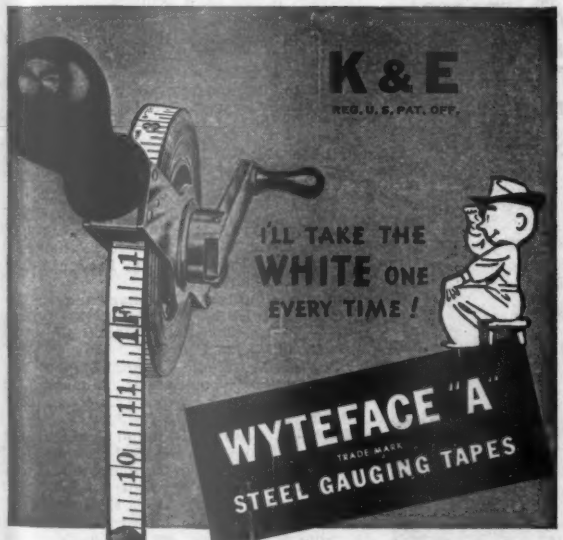

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ter, Loma Blanca "Francisco Guerra Chapa Survey, Abstract 93," 4½ mi. SE of Falfurrias, dry, TD 6,850 ft.

Sun 1 Dan Sullivan et al, Dan Sullivan discovery, "El Tule" A Garcia Grant, 8 mi. E of Falfurrias, TD 8,522 ft., perforated 54/8,508-17 ft., PT 147.66 bbl. day, 9/64-in. choke, gas-oil ratio 523 to 1, tubing pressure 880 lb., casing pressure 2,260 lb., gravity 35.4°, no water.

Cameron County: Great Lakes Carbon 1-A Yturria Land & Livestock Co., Santa Isabel Grant, 5 mi. SW of Point Isabel, TD 9,473 ft., plugged-back total depth 5,990 ft., drilled to 6,144 ft. by Great Lakes, show gas in perforations 6,042-46 ft., deepened by Pure Oil Co. to 9,473 ft., ran log, turned back to Great Lakes and completed for PT 6,000,000 cu. ft. gas day through perforations 5,980-83 ft.

De Witt County: Standard of Ohio 1 Andrew Kozek, L. Y. Criswell Survey, Abstract 116, 4 mi. SE of Yorktown, dry, TD 8,515 ft.

Duval County: M. E. Davis 1 L. G. Denman, Santos Garcia Grant, Abstract 1,985, 1½ mi. E of Realitos, dry, TD 5,521 ft.

Hidalgo County: Seaboard Oil 3 Boston-Texas Land Trust Co., Los Guages and Los Maguelles Grants, 5 mi. W of McCook, dry, TD 5,510 ft.

Kenedy County: Texas 1 Yturria Land & Cattle Co., San Juan de Carricitos "Jose Narcisco Cabazos, Abstract 8," Punta Del Monte Ranch, 8½ mi. NE of Raymondville, dry, TD 7,810 ft.

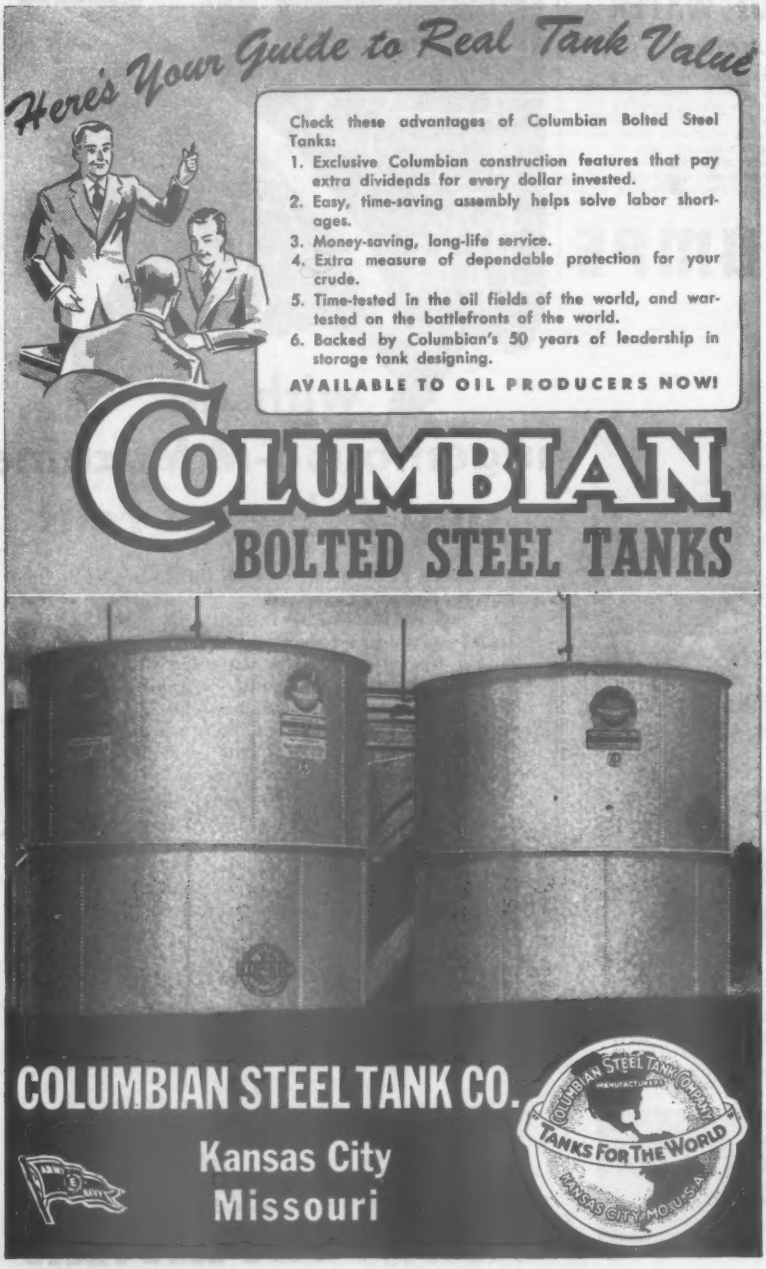
San Patricio County: W. Earl Rowe and Republic Natural Gas Co. 1 Mrs. A. B. Coffin, Edward J. McGloin Survey, 3 mi. SW of Mathis, dry, TD 4,920 ft.

Starr County: Bishop & Moss 1 Pedro Lopez, Jose Salvador de la Garza Porcion 88, 2½ mi. SW of Ross field, dry, TD 2,813 ft.

T. E. Stephens 4 M. Hinojosa et al. 35 mi. NE of Rio Grande City, in Porcion 111, TD 2,096 ft., perforations at 2,063-68 ft. and 2,040-62 ft., PT gas well on 1/16-in. choke, no gage, tubing pressure 770 lb., casing pressure 835 lb. Gas discovery.

Victoria County: Northern Ordnance Corp. 1 O. W. Schaefer, W. T. Eaton Survey, 2 mi. N of Mission Valley, junked and abandoned at 10,249 ft.

Rowan & Hope 1 M. E. McCampbell, Jas. McConnaughty Survey, 2 mi. S and E of Telferner field, dry, TD 4,581 ft.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ILLINOIS

Wildcats in Three Counties Are Substantial Producers

CENTRALIA.—Three wildcats in Gallatin, Hamilton and Jefferson counties, respectively, were completed as commercial oil producers during the week, opening or extending pools in Asbury Township, Gallatin; Crook Township, Hamilton, and Casner Township, Jefferson counties. The Gallatin County discovery, Oil Management 2 Goforth, in 27-7s-10e, was good for 184 bbl. initially. The Hamilton County well, National Associated Oil Co. 2 Vada Johnston in 10-5s-7e, started at 60 bbl. a day, and the Jefferson County well, Texas Co. 1 E. Kasbon, in 8-2s-1e, pumped 305 bbl. in 24 hours. Further details are contained in the wildcat completion list below.

The largest of the 27 oil wells reported completed during the week was Pure Oil Co. 1 Guyott A, SW SW SW 36-3n-8e, in the Schnell pool, Richland County, which flowed 1,100 bbl. in 24 hours from McClosky lime at 2,969 to 3,054 ft., at intervals. It had been acidized.

In Jefferson County, 2 miles from any other production, Arthur A. Cameron 1 J. C. Bizot, NE NE NW fractional section 30-1s-2e, 8 miles northwest of Carmi, was being put on the pump after swabbing 7 bbl. per hour from Benoist sand at 2,054-62 ft. It had not been shot.

ILLINOIS WILDCAT COMPLETIONS

Clay County: H. M. Williams 1 Cash, SE SW SW 25-3n-5e, dry at 3,005 ft.

Franklin County: Ohio 1 U. S. C. & C. Co. "B," SW SE NW 3-6s-4e, dry at 3,393 ft., lower Menard 2,346 ft., Weiler 2,942 ft., Aux Vases 3,140 ft., Fredonia 3,284 ft., St. Louis 3,389 ft.

Gallatin County: Oil Management 2 Goforth, SE SE SW 27-7s-10e, 184 bbl. in 24 hours, Tar Springs sand top 2,098 ft., TD 2,123 ft.

Phillips Petroleum 1 Ford, SW SE NW 15-9s-9e, dry at 2,807 ft., Menard 1,780 ft., Cypress 2,342 ft., Aux Vases 2,652 ft., McClosky 2,718 ft.

Hamilton County: National Associated 2 Vada Johnson, NE SW SE 10-5s-7e, pumped 60 bbl. in 24 hours, Aux Vases sand 3,393-3,401 ft., shot.

Jefferson County: Texas 1 E. Kazbon, SE SE NW 8-2s-1e, pumped 305 bbl. in 24 hours and then 208 bbl. in 24 hours from Rosiclare lime at 2,103-28 ft., TD 2,255 ft., PB to 2,135 ft.

Lawrence County: Texas 1 J. R. Roderick, SW SW SW 27-5n-13w, dry at 2,313 ft., Vienna 1,622 ft., Cypress 1,910 ft., Weiler 1,971 ft., Benoist 2,047 ft., Aux Vases 2,093 ft., McClosky 2,206 ft., St. Louis 2,298 ft.

Marion County: Frontier Fuel Oil 1 M. S. Lacy, NE NW NW 9-4n-4e, dry at 2,482 ft., Vienna 1,775 ft., Tar Springs 1,800 ft., Glen Dean 1,880 ft., lower formation depths not available.

Richland County: Texas 1 I. Kesler, SW SW NW 10-4n-10e, dry at 3,151 ft., Glen Dean 2,438 ft., Cypress 2,642 ft.

PIPELINES SUPPLY YANKS IN FRANCE
A vast network of pipelines now is supplying oil to Allied aircraft, tanks and motor vehicles in Normandy, London radio said today in a broadcast recorded by CBS.
"One set of pipelines carries the oil from tankers off the beaches to tanks ashore. From the tanks, more feeder lines follow the advancing Allied forces. As the advance continues, more tanks and more pipelines are added," London reported.
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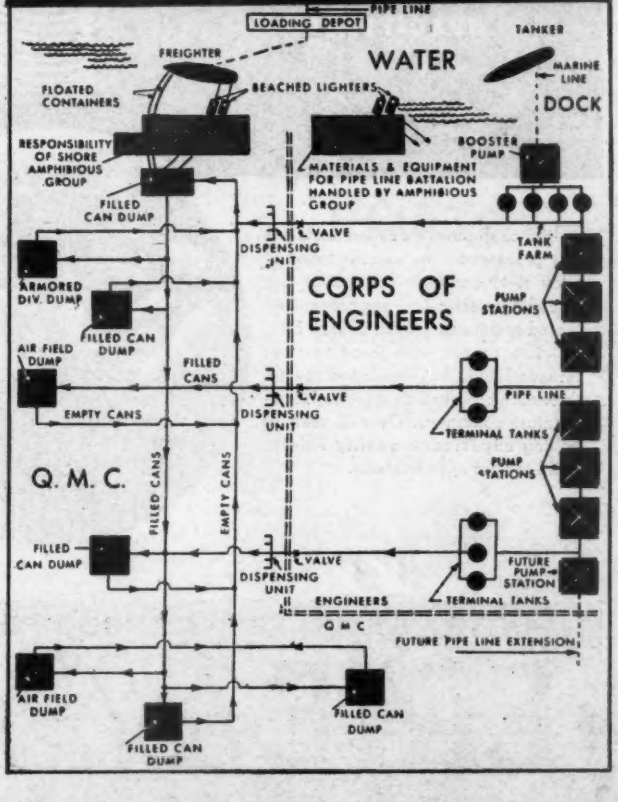

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Benoist 2,846 ft., Aux Vases 2,943 ft., McClosky 3,014 ft.

Schuyler County: Northern Ordnance 1 Greuel, NW NW NE 7-3n-1w, of fourth principal meridian, dry at 694 ft., Maquoketa top 617 ft.

Wayne County: J. W. Rudy et al 1 A. Clark, NW NW SW 32-3s-5e, dry at 3,490 ft.

White County: B. M. Heath et al 1 Farmer, SW NE SE 18-7s-8e, dry at 3,173 ft., upper Kincaid 1,770 ft., Tar Springs 2,340 ft., Cypress 2,696 ft., Benoist 2,836 ft., Aux Vases 2,965 ft., McClosky 3,042 ft.

MICHIGAN

Big Well in Adams Field In Arenac County

SAGINAW.—The north end of the Adams pool in Arenac County began to look big as Bolger & Rose State 3, NE SW NW 14-19n-3e, a north extension, came in flowing 250 bbl. per hour. Dundee dolomite was found at 2,885-88 ft. and completion was made at 2,905 ft.

There were 15 completions last week, including 5 oil wells, 3 gas wells and 7 dry holes. Of the dry holes, 5 were wildcats. New permits for the week totaled 19, of which 4 were for Newaygo County, 3 for Arenac, 2 for Missaukee, and 1 each for Mecosta, Montmorency, Muskegon, Montcalm, Allegan, Bay, Gladwin, Ionia, Isabella and Osceola counties.

MICHIGAN WILDCAT COMPLETIONS

Clare County, Garfield Township: Sohio 1 Loker, N½ SW NW 7-17n-6w, dry in Monroe formation, TD 4,056 ft.

Huron County, Sand Beach Township: Wallace Markle 1 Groll, SW SE NW 27-16n-15e, dry in Traverse, TD 1,500 ft.

Kalkaska County, Clearwater Township: McClanahan Oil 1 Terpening, S½ NW NW 8-2n-5w, dry, TD 4,278 ft.

Muskegon County, Holton Township: Muskegon Development 1 Oatman, SE NW SE 3-12n-15w, dry in Monroe formation, TD 2,576 ft.

Osceola County, Evart Township: Sun Oil 1 Boyd, S½ SW SW 28-17n-8w, dry in Monroe, TD 3,973 ft.

APPALACHIAN FIELD

W. Va. Oriskany Wildcat Checks Low on Onondaga

PITTSBURGH.—In Clay district, Hancock County, West Virginia, John T. Galey et al topped the Onondaga lime in its Oriskany wildcat on Tomlinson Run Park (H. Balser) at 4,398 ft. with a surface elevation of 886 ft. Down to the Berea this test ran higher than the discovery well in the district, but the top of the Onondaga is lower than in the discovery well. The discovery well reached Oriskany water which causes concern for the second test.

On Chestnut Ridge in Wharton Township, Fayette County, Pennsylvania, Greensboro Gas Co. topped the Tully lime at 6,119 ft. in No. 5 Barton with the bottom at 6,194 ft. and drilling through the Marcellus at 6,279 ft. The Tully appears over 100 ft. higher on structure than the nearest well.

In Butler County, the top of heavy dark Trenton lime in the deep test on J. G. Hockenberry farm in Mercer Township by Manufacturers Light & Heat Co. is tentatively placed at 8,906 ft. with the present depth now 9,088 ft.

CALIFORNIA

Seal Beach Productive Limits Extended

LOS ANGELES.—Shell Oil Co., Inc., extended the productive limits of the Seal Beach field by completing 5 Bryant flowing 1,554 bbl. of 31.2°-gravity oil and 1,775,000 cu. ft. of gas daily from the McGrath zone, total depth 7,848 ft. This well is north of the Seal Beach fault which hitherto has marked the productive limits of the field, and will probably add about 100 proven acres to the field's total. Previous drilling further out on the structure north of the fault was not productive and for several years this retarded work north of the fault.

The Rio Vista gas field yielded two good flowing wells, one of which proved a new gas sand that shows excellent pressure and production possibilities. The discovery well was Standard's 6-H Perry Anderson which registered an initial gas flow of 16,000,000 cu. ft. Standard will proceed with immediate development of this new gas zone which will probably be designated as the Anderson sand. It is of Eocene-age and will probably extend over at least a part of the field to the east.

Standard has found Eocene oil sand in 11-44 Kern County Land in the Greeley field at 13,355 ft. It has a good gas odor but does not show any cut at 13,421 ft. If the Eocene should produce at Greeley, it may also be found productive at Rio Bravo to the north, therefore the outcome of the Greeley test will be watched with interest.

Elk Hills and Buena Vista Hills continue to show increased drilling and the production of both is increasing. At Elk Hills, The development program involves the drilling of new wells in undrilled areas whereas at Buena Vista Hills, operators are developing a deeper Pliocene sand discovered several months ago by Standard and designated as the 27-B pool.

N. CENTRAL TEXAS

Clay County Discovery Improved With Acid

WICHITA FALLS.—A Clay County wildcat, Continental Oil Co. and Edge Oil Co. 1 Crockett, east of Buffalo Springs, showed considerable improvement after reacidizing with 1,000 gal. through perforations at 6,490-6,500 ft. It swabbed 171 bbl. of oil and 11 bbl. of drilling fluid in 24 hours, and continued testing.

Shell Oil Co., Inc., 1 J. A. Raley, ¼ mile south of production in the area 6 miles northwest of Jacksboro, Jack County, flowed 360 bbl. of oil in 4 hours, natural, from Chappel lime pay at 5,456-75 ft., through open 2-in. tubing.

Cooke County.—Sinclair Prairie Oil Co. 1 Kitchens, wildcat 1 mile east of Callisburg, was a failure at 6,525 ft.

NORTH TEXAS WILDCAT COMPLETIONS

Archer County: Gulf 1-E Prideaux, Sec. 1835, TE&L Sur., 1 mi. N and 3 mi. E of Westfork, dry, dolomite TD 5,924 ft., elev. 1,135 ft., Mississippian 5,415 ft., Ellenburger 5,601 ft.

M. T. McLaughlin and H. R. Theck 1 Roy King, Tr., "Richardson," Blk. 14, Thos. McCoy Sur., A-269, 4 mi. N Olney, elev. 1,173 ft., sandy lime show oil 1,143-45 ft., sand slight show oil 1,145 ft., pumping 55 bbl. oil day, gravity 37.8, TD 1,149 ft.

Northern Ordnance 1 Abe Cox, Wm. Brunk Sur., A-80, 2 mi. E and 1 mi. N Park Springs, dry, TD 4,870 ft., elev. 770 ft., Ellenburger 4,078 ft.

Northern Ordnance 1 R. L. Myers, J. B. Botard Sur., A-75, 2 mi. N and 1 mi. W Gainesville, dry, TD 3,835 ft., elev. 786 ft., Ellenburger 3,724 ft.

Clay County: Nixon Petroleum 1 H. W. Perkins, Blk. 79, Byers Bros. subd., dry, TD 1,845 ft.

Cooke County: Benson Bros. 1 J. I. Welch, M. W. Ross Sur., A-853, 6 mi. N and 1 mi. E Munster, dry, TD 1,502 ft.

Jack County: Continental 1 A. E. Sewell, Wm. Montry, dec'd., Sur., A-404, 4 mi. S Jacksboro, dry, TD 5,994 ft., elev. 1,266 ft., Caddo 4,606 ft., Ellenburger 5,913 ft.

Jones County: Great Lake Carbon Co. 1 M. T. Ramsey et al, Sec. 79, Blk. 14, T&P, dry, TD 2,205 ft., elev. 1,688 ft., Flippen sand 1,697-1,710 ft.

WEST CENTRAL TEXAS

ABILENE.—A block of approximately 5,600 acres in central Fisher County, has been leased by Hunt Oil Co., reportedly with a contract to start a 5,000-ft. Strawn test within 90 days. The acreage is in the east half of Survey No. 314, Bastrop County School Lands, and the east half of Survey No. 315, T. H. Crosby Survey.

EASTERN TEXAS

Smackover Failure Balances Discovery

DALLAS.—Coincident with a final completion gage on East Texas' first Smackover lime producer, another project to the same formation about 60 miles to the northwest in Red River County looked like a failure. The Texas Co. 1 Solomon, 8 miles southeast of Clarksville, topped the Smackover lime at 5,920 ft., cored from 5,971-81 ft., recovering 9 ft. of greenish gray, limey sandstone, with no shows and was last reported drilling ahead below 6,062 ft. in lime, with no shows found in the Smackover section. This wildcat likely will drill ahead to granite before being abandoned. A red sand section just below the Smackover section may offer a chance for production.

In Bowie County, Barnsdall Oil Co. and Sohio Petroleum Co. 2 Heilbron, discovery Smackover producer southwest of Texarkana, was completed at 7,716 ft., flowing 155.25 bbl. of 41.4-gravity oil in 24 hours through ¼-in. choke, gas-oil ratio 8,500 to 1, tubing pressure and casing pressure 1,300 and 1,200 lb., respectively.

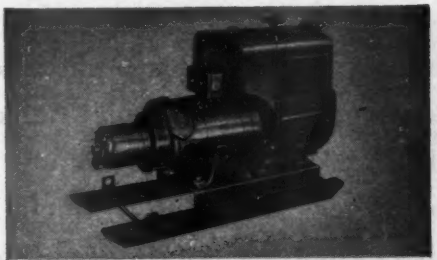
R. L. Peveto and J. B. Stephens of Tyler were preparing to spud 1 W. D. Farrar, a wildcat 1½ miles northwest of Talco in the William Walker Survey, on a Magnolia Petroleum Co. farmout.

Henderson County.—Ohio Oil Co., Hyde & Monchief 1 Coker, wildcat in the J. M. Cobasa Survey, elevation 508 ft., topped first anhydrite stringer at 7,740 ft., second at 8,056 ft., third stringer at 8,090-8,110 ft., and was drilling ahead past 8,262 ft.

Houston County.—In the Grapeland field, Grapeland Oil Co. 1-A Horne, J. Herrod Survey No. 611, was drilling below 7,600 ft., and J. S. Ivy and W. T. Moran 2 Murray, 8 miles northwest of Weldon, was making hole below 5,020 ft., on a 10,000 ft. contract.

EAST TEXAS WILDCAT COMPLETIONS

Panola County: Columbia Carbon et al 1 Julia Baldwin, Geo. Glass Sur., A-225, 3 mi. SE Woods, dry, TD 6,500 ft., elev. 243 ft., Paluxy 3,145-55 ft., massive anhydrite 4,910-20 ft., James 5,640-50 ft., Trans. zone 6,360-70 ft.



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MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Smith County: Buccaneer Petroleum 1 J. M. Plunk, E. M. Hunt Sur., A-498, 6 mi. NW Garden Valley, dry, TD 5,027 ft., Pecan Gap 2,715-30 ft., Austin chalk 4,085-4,115 ft., Woodbine 4,995 ft.

ROCKY MOUNTAIN

Way Paved for Test in Tertiary Beds in Sweetwater

DENVER. — Action of the secretary of the interior in approving unitization plan on the Alkali Creek structure in Sweetwater County, Wyoming, paves the way for an important exploratory well in the Tertiary beds on that structure. The unit comprises approximately 14,000 acres about equally divided between the Alkali Creek Oil & Gas Co. (R. S. Shannon) and the Mountain Fuel Supply Co. Each company will operate its own acreage.

The structure is in Twp. 13n-99 and 100w, and lies to the north of the Hiawatha field which straddles the Colorado-Wyoming boundary. The Prairie Oil & Gas Co. drilled a test in 1928 in NW SE 18-13n-99w, which had gas at 3,625 ft. and water at 3,765 ft., where it was abandoned.

Kirby Creek test. — Location was announced this week for a test to the Tensleep on the Kirby Creek structure, Hot Springs County, Wyoming, at the extreme southern end of the Big Horn basin and 15 miles east of Thermopolis, Pacific Western Oil Corp. 1 Government, SE NE NE 21-43n-92w.

Water in Dakota at Bell Rock.—Stanolind Oil & Gas Co. et al 1 Hanewaldt, NE SE SE 4-6n-92w, Bell Rock structure, Moffat County, Colorado, topped the Dakota at 8,233 ft. At 8,317 ft., a drill-stem test at 8,268-8,303 ft., open 17 minutes, showed 1,700 ft. of fresh water through a ½-in. choke. It will continue to the Sundance at around 8,800 ft.

Water line at Frannie.—Continental Oil Co. 1-A Government, SW NE SE 25-58n-98w, an outpost at the extreme southeastern part of the Frannie field, established water line for the Madison. It had clear water in the Madison at 3,371 ft., total depth. It is two locations east of 1-E Mau, which made 10 bbl. an hour from the Madison, but was unproductive in the Tensleep.

Show in Farmington well. — Union Oil Co. of California 1 Greene, CWL SW SW 28-25n-3w, Farmington district, Teton County, Montana, which had a show for a producer in the Madison at 1,737-46 ft., proved disappointing upon being tested, making only 2 bbl. of 21°-gravity oil with 19 bbl. of sulfur water in 24 hours after acidizing with 450 and 1,000 gal. A second well is being drilled ½ mile to the west in same company's 1 Carlson, SE SW SE 29-25-3.

WYOMING WILDCAT COMPLETIONS

Park County, Frannie: Continental Oil 1-A Government, SW NE SE 25-58n-98w, TD 3,371 ft., top Tensleep 2,894 ft., some saturation, but not commercial, drill-stem test Madison at 3,348-60 ft., yielded fresh water, plugged.

MONTANA WILDCAT COMPLETIONS

Pondera County, Ledger: Hageman & Pong 1 Foltz, SW SW SW 35-29n-2w, TD 2,057 ft., Ellis-Madison 2,053 ft., dry, Sunburst 1,830-50 ft., little water.

Teton County, Farmington area: Union Oil of California 1 Greene, SW SW 28-25n-3w, TD 1,746 ft., Ellis-Madison 1,737 ft., acidized 450 and 1,000 gal., 2 bbl. 21-gravity oil and 19 bbl. sulfur water in 24 hours.

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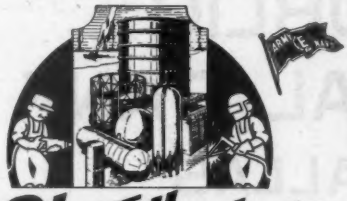

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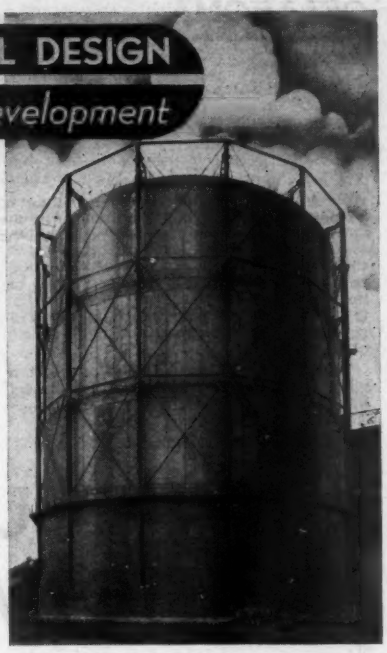

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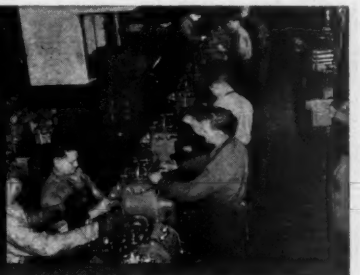

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OKLAHOMA

101 Active Operations In West Edmond Field

WEST EDMOND continues to hold the main interest of Oklahoma operators with active operations, either drilling or rigging up, totaling 101 at the end of the week. There is some question as to the total number of complete drilling rigs in the field, but no doubt that at the present time the greatest concentration of heavy duty rotary rigs in the country is in this field, with more rigs being constantly brought in from other parts of the country.

Carter County.—Lone Grove pool got a good producer when Texas Co. 4 Chubbee, SE NE SW 5-5s-1w, showed for an estimated 50 bbl. per hour from 2,774 ft.

Garvin County.—The outstanding wildcat strike of the week, Sinclair Prairie Oil Co. 1 Allred, NE NW SE 20-3n-2e, south of Stratford, on drill-stem test at 1,898-1,909 ft., showed considerable gas and about 1,000 ft. of 38°-gravity oil. Pipe is being set and production test will be run.

E. J. Kubat et al 1 Dixon, NE SW SE 9-3n-1e, wildcat between the Pauls Valley and East Pauls Valley pools, on which drill-stem test looked good, is drilling out plug and will be tested this week.

McClain County.—Carter Oil Co. 1 Johnson, a wildcat in SW SE 30-8n-2w, 5 miles northeast of its Anadarko basin Wilcox discovery, 1 Cottingham, but which the company announced as being on a separate structure, topped the Hunton at —6,374 ft. and the Viola at —6,682 ft., and is reported as being both regionally and structurally high. The Cottingham well is producing from Wilcox sand below 10,500 ft.

REPUBLIC NATIONAL BANK OF DALLAS

DALLAS, TEXAS

CONDENSED STATEMENT OF CONDITION AS OF JUNE 30, 1944

RESOURCES

Loans and Discounts	$ 65,584,716.34
Banking House	1,872,000.00
Furniture and Fixtures	266,907.94
Stock in Federal Reserve Bank	375,000.00
U. S. Government Securities	84,501,824.37
State, Municipal and Other Securities	1,116,199.69
Cash in Vault and with Banks	56,524,093.67
Total	$210,240,742.01

LIABILITIES

Capital	$ 6,250,000.00	
Surplus	6,250,000.00	$ 12,500,000.00
Undivided profits		904,548.72
Reserve for Dividend Payable July 1, 1944		125,000.00
Reserve for Taxes, Etc.		986,219.75
DEPOSITS:		
Individual	$97,712,531.18	
Banks	60,352,710.21	
U. S. Government	37,659,732.15	195,724,973.54
Total		$210,240,742.01

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

PERMIAN BASIN

Deep Testing Spreads in Permian Basin Area

MIDLAND.—Locations for two deep wildcats were made last week. In Cochran County, a mile south of Morton, Stanolind Oil & Gas Co. staked 1 E. L. Slaughter, 440 ft. out of the NE cor. of Labor 49, League 101, Jeff Davis County School Land, to be drilled to 8,500 ft. or granite. It is about 8 miles northwest of the nearest Permian lime production.

In northwestern Andrews County, Magnolia Petroleum Co. is preparing to drill an 11,000-ft. test on the northwest edge of the Fullerton field. Designated as 1-A Ralph, the location is in NW SE Section 12, Block A-37, PSL Survey, a mile northwest of the nearest Fullerton field producer. Fullerton deeper pay prospects were enhanced considerably last week by the performance of Mid-Continent Petroleum Corp. 1-7 University, 2 miles south of the field, with its 150 bbl. per hour flow from the Siluro-Devonian pay section.

Pecos County.—Humble Oil & Refining Co. 1 State National Bank of El Paso, wildcat near Baldridge, in Section 140, T&SL Survey, is preparing to make a production test at 5,449 ft., with 5½-in. casing cemented at 5,445 ft. The well tried to blow out at this depth, where it is believed to be in the Ellenburger. Humble 1 Word, deep wildcat 8 miles northeast of Fort Stockton, was drilling past 9,150 ft. in shale with no shows reported. Standard Oil Co. of Texas 1-3 Mac Der Co., wildcat 8 miles southeast of Owego, Section 64, Block 11, H&GN Survey, tested 4,000,000 cu. ft. of dry gas through casing perforations at 5,091-5,166 ft.

Winkler County.—Daily potential of 2,431 bbl. of 43.8-gravity oil through ½-in. choke has been reported by Gulf Oil Corp. 46-E Keystone, extending the Keystone-Ellenburger field 1¼ miles southeast. After drilling to 10,005 ft. in igneous rock, the well was completed through casing perforations at 9,879-9,909 ft., in the Ellenburger. A north extension to the deep Wheeler-Ellenburger field, eastern Winkler County, looks certain at Superior Oil Co. of California 1 R. A. Wheeler. Its last drill-stem test, from 10,652-10,750 ft., showed a steady blow of gas and recovered 500 ft. of water blanket heavily cut with oil and gas.

Yoakum County. — Honolulu Oil Corp. has staked location for 1 McLane, wildcat 660 ft. from north and west lines of Section 324, John Gibson Survey, being nearly 2 miles south of the same company's 1 Hertel, which was drilling below 4,862 ft. after topping San Andres lime at 4,642 ft., about 28 ft. higher than a dry hole 2 miles to the southeast.

WEST TEXAS WILDCAT COMPLETIONS

Cochran County: Seitz, Comegys & Seitz 1 Cameron Lumber, SE SE Sec. 9, Blk. 86, Greer CSL, 2½ mi. E Morton, dry, TD 4,944 ft., elev. 3,714 ft., anhydrite 2,300 ft., brown lime 3,450 ft., San Andres 3,740 ft.

Pecos County: Humble 1 Mrs. T. P. Kennedy, Sec. 81, Blk. 3, T&P Sur., dry, TD 4,685 ft., elev. 3,212 ft., Delaware lime 4,493 ft., Delaware sand 4,516 ft.

Reagan County: Standard Oil of Texas 1 University, Sec. 12, Blk. 12, University Lands, dry, TD 2,938 ft.

Upton County: Texas Pacific Coal & Oil 1-A University, Sec. 14, Blk. 4, University Lands, dry, TD 3,872 ft., elev. 2,796 ft., anhydrite 1,360 ft., salt 1,420 ft., Yates 2,230 ft., solid lime 3,775-3,872 ft.

PANHANDLE

AMARILLO. — Pure Oil Co. 1 Sneed, Dallam County wildcat which set pipe at

5,819 ft. after drilling to 6,779 ft. in granite, on last test perforated pipe at 4,150-89 ft. with no results and has been abandoned. Tests through lower perforations had shown only salt water. In Oldham County, Stanolind Oil & Gas Co. 1 Herring was at 6,307 ft. in black shale, sidetracking.

PANHANDLE WILDCAT COMPLETIONS

Gray County: Texas Co. 1 Dial, Sec. 30, Blk. 25, H&GN Sur., 7 mi. SE Le Fors, elev. 2,888 ft., IP 960,000 cu. ft. gas, 331 lb., RP, TD 3,201 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Humble Oil & Refining Co. 1 Federal-Leonard Oil Co., deep project in 13-26-37, southeastern corner of Lea County, drilled ahead below 11,514 ft. in shale, with no shows reported. Humble 1 Federal-Keinath, scheduled 11,000-ft. test in 1-21-38, about 15 miles west of the Union pool in northwestern Andrews County, Texas, was drilling below 6,707 ft. The Texas Co. 2 Cole, in 27-19-33, a south offset to the same company's discovery well, had no shows reported in drilling to 3,643 ft., at which depth it was running electrical log.

SOUTHEAST NEW MEXICO WILDCAT COMPLETIONS

Lea County: Culbertson & Irwin, Inc. 1 Burch, SE SE 15-19s-34e, dry, TD 5,070 ft., elev. 3,812 ft., anhydrite 1,770 ft., brown lime 4,060 ft., Yates 3,400 ft.

WILDCAT COMPLETIONS AND DISCOVERIES

	Week ended August 19, 1944					Cumulative total, 1944				
	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ohio	0	0	0	0	0	0	0	11	43	54
Indiana	0	0	0	2	2	3	0	0	18	21
Illinois	3	0	0	9	12	22	0	0	211	233
Kentucky	1	0	0	3	4	7	0	0	52	59
Michigan	0	0	0	5	5	8	0	2	160	170
Kansas	1	0	0	7	8	35	0	5	266	306
Nebraska-Missouri-Iowa	0	0	0	0	0	1	0	0	9	10
Oklahoma	0	0	0	5	5	39	0	18	165	222
Texas:										
North Central	1	0	0	7	8	43	0	1	192	236
West	0	0	0	4	4	20	0	3	110	133
Panhandle	0	0	1	0	1	0	0	1	7	8
Eastern	0	0	0	2	2	5	0	1	84	90
Gulf Coast	2	0	1	10	13	26	9	12	150	197
Southwest	1	0	1	2	4	18	4	14	151	187
Total Texas	4	0	3	25	32	112	13	32	694	851
Louisiana:										
Northern	0	0	0	0	0	3	0	0	36	39
Southern	0	0	0	0	0	5	6	0	35	46
Total Louisiana	0	0	0	0	0	8	6	0	71	85
Arkansas	0	0	0	2	2	2	1	0	36	39
Mississippi	0	0	0	2	2	2	0	0	46	48
Alabama-Georgia-Florida	0	0	0	0	0	2	0	0	12	14
Montana	0	0	0	2	2	3	0	1	24	28
Wyoming	0	0	0	1	1	10	0	1	13	24
Colorado-Utah	0	0	0	0	0	2	0	1	21	24
New Mexico	0	0	0	1	1	4	0	3	37	44
California	0	0	0	1	1	4	0	5	130	139
Total United States	9	0	3	65	77	264	20	79	2,008	2,371
Total previous week	11	1	3	74	89					

MISSISSIPPI

Second Pool Looms for Lincoln County

JACKSON.—Mississippi wildcats began to live up to expectations as the California Co. 1 Douglas, approximately NE SE 10-6n-8e, in Lincoln County, about 10 miles southeast of the Brookhaven pool, is reported to have cored saturated sand in the Massive at 10,515 ft., with oil said to be 38° gravity, dark green in color. The well has a total depth of 10,641 ft., estimated bottomed in Lower Cretaceous, and casing is being run, separators set and two 1,000-bbl. tanks are being erected for testing.

In Jeff Davis County, S. W. Richardson & Berry, SE NW 24-9n-19w, 60 miles west and slightly south of the Eucutta pool, is being dually completed as a gas distillate discovery, estimated at 7,500,000 cu. ft. of gas and about 70 bbl. of distillate per day, through perforations at 7,855-80 ft., 8,075-8,106 ft., and 8,120-32 ft.

Four wells in the Gilbertown pool of Alabama are waiting on pumping equipment or being worked over, before being placed on production. Humble Oil & Refining Co. 1 Skinner, SE NW 10-3n-10e, Escambia County wildcat, is drilling below 10,252 ft., with no shows reported. Stanolind Oil & Gas Co. 1 Pullen, Land Lot 133, Land Dist. 10, Mitchell County, Georgia, has been abandoned after reaching granite at 7,474 ft., and drilling to a total depth of 7,487 ft.

MISSISSIPPI WILDCAT COMPLETIONS

Jasper County: Leonard Jones et al 1 Jones, NW SE 11-1n-13e, dry, TD 5,177 ft., chalk 3,855 ft., Eutaw 5,125 ft.

Simpson County: Gulf 1 Roberts, approx. NW SE NW 23-2n-5e, dry, TD 8,908 ft., Eutaw 7,044 ft., Marine Tuscaloosa 8,296 ft., Massive sand 8,503 ft., Lower Cretaceous 8,747 ft.

ALABAMA WILDCAT COMPLETIONS

Mobile County: Charles Sykes 1 Stafford, NE NE 24-7s-3w, dry, TD 4,744 ft.

GEORGIA WILDCAT COMPLETIONS

Mitchell County: Stanolind 1 Pullen, Land Lot 133, Land Dist. 10, dry, TD 7,487 ft., Eutaw 2,905 ft., Marine Tuscaloosa 3,945 ft., massive 4,297 ft., Lower Cretaceous 4,479 ft., granite 7,474 ft.

KANSAS

Carter Gets Small Gasser South of Nunn Pool

CARTER OIL CO. 1 Miller, NE NE SW 26-22s-34w, in Finney County, about 6 miles south of the Nunn pool and 15 miles north of the Hugoton gas field, was completed for 700,000 cu. ft. of gas, after being acidized with 1,500 and 1,000 gal. The well was drilled to 2,830 ft., then plugged back to 2,633 ft. Formation tops were given as Herrington 2,601 ft., Krider 2,663 ft., Winfield 2,719 ft., and Fort Riley 2,802 ft.

Kansas operators reported 34 new starts this week, including 11 new wildcats, compared to 39 completions, which included 8 wildcats. Of the completions, 21 were oil wells, 1 was a gas well and 17 were dry. Most of the completed oil wells were small to average in initial production, a 412-bbl. well in the Chitwood pool and a 578-bbl. completion in the Zenith-Peace Creek pool being the best completions of the week.

In Pratt County, The Texas Co. failed to extend the Frisbie pool in two tries, 1 Toland, NE NE SW 7-26s-13w, and 1-B Toland, NE SE 12-26s-14w, both being apparent failures.

In Barber County, Dickey 1 Hargis, E½ SE SW 3-31s-14w, a wildcat 3 miles northwest of the Lake City pool, after acidizing with 5,000 gal., appeared to be good for 10,000,000 cu. ft. of gas and was making a spray of oil. Total depth is 4,681 ft., and casing is set at 4,668 ft. Shut-in pressure is reported at 1,400 lb.

KANSAS WILDCAT COMPLETIONS

Butler County: Sohio 1 Bert Wells, NE NE NE 30-28s-6e, dry, TD 3,167 ft., Arbuckle 3,158 ft.

Comanche County: Phillips 1 G. H. Davis, SE SE SE 10-33s-16w, dry, TD 5,604 ft., Arbuckle 4,624 ft.

Cowley County: Zephyr Drilling 2 Bailey, SW NE SE 8-33s-5e, dry, TD 2,440 ft., Layton 2,415 ft.

Ellis County: Phillips 1 Shumaker, SE NW SW 23-14s-17w, dry, TD 3,541 ft., Arbuckle 3,486 ft.

Kingman County: Phillips 1 Kuhns, SW SW NW 3-27s-7w, dry, TD 4,368 ft., Arbuckle 4,338 ft.

Osborne County: Stanolind 1 Paul C. Ahrens, NE NE SE 30-9s-14w, dry, TD 4,058 ft., Arbuckle 4,005 ft.

Pratt County: Paul Hatfield & Kinkle 1 Lemon, NW NW NW 33-27s-13w, dry, TD 4,580 ft., Arbuckle 4,528 ft.

Sumner County: M. J. Sullivan 1 Nixon, NE NE 22-30s-1w, flowed 209 bbl., pay zone 3,917-29 ft., TD 3,929 ft., Kansas City 2,896 ft.. Mississippi lime 3,505 ft., Simpson 3,917 ft.

CANADIAN FIELDS

New Potential Field Indicated Near Innisfree

CHATHAM. — A new potential oil and gas field in the north-central plains area of Alberta is indicated near Innisfree, where May 2, LSD 4, 27-51-11w4, at 2,348 ft. has taken cores showing sulfur free greenish-brown crude. The new field is north of the Viking gas field and northeast of the Vermilion field, and southeast of Edmonton. Test is sponsored by A. E. Verner, who is starting Verner-Canusa 1 in LSD 4, 15-51-11w4, 1¼ miles southeast.

Taber. — Extension of the Taber field 2 miles west of the discovery well is indicated by Taber-Province 67-15-A, LSD 13, 15-9-17w4, with a good oil show in the Taber sand at 3,194-3,214 ft. The well, lacking the original discovery with the Major-Taber 1 gasser 1 mile farther southwest, will be deepened to test the lime.

Athabaska.—In northern Alberta, Decs 4, LSD 2, 15-66-23w4, is testing heavily saturated oil sand at 1,662-74 ft.

Butch was a good driller but strictly on the superstitious side. He used a pet Chinese rabbit's foot to keep his holes clean only the last time it didn't work on account of it was a Chinese holiday and a packer got all tore up and stuck. The Boss was superstitious about packers—or maybe it was a formation tester—getting stuck and fired Butch and ordered a Baker Rotary CASING Scraper which does the work a lot better than a rabbit's foot. For cement sheaths, burrs from gun-shot holes, and paraffine—the Scraper gets 'em all.

BAKER
ROTARY CASING SCRAPER
BAKER OIL TOOLS, INC.

PROVED IN PEACE—IN WAR

'BESTOLIFE Lead Seal Joint Compound has been used successfully in the Oil and Refining industries for the past fifteen years. During that time, it has proved itself superior in protecting threads and in providing tight joints which can be broken easily.

Today, 'BESTOLIFE has enlisted in the Navy, Merchant Marine and Defense Plants for the duration, and we are proud of this assignment to help in the Victory effort.

But there are still ample stocks of 'BESTOLIFE available on any priority rating, at supply house field stores in every drilling district in the United States and Canada. Use 'BESTOLIFE Tool Joint Compounds for best results!

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I. H. GRANCELL
1601 EAST NADEAU STREET
LOS ANGELES 1, CALIFORNIA

Among the

Drilling Contractors

Carl Short, Dallas, has been awarded the contract on Pure Oil Co. 1 L. L. Trahan, a wildcat in the New Iberia area, Iberia Parish, Louisiana. Proposed depth, 11,000 ft.

Pryor & Lockhart, drilling contractors, are moving in materials for the Superior Oil Co. of California 1 Patterson, in SE SE SW 16-28-13w, Pratt County, Kansas, 8 miles southwest of the Iuka pool and 7 miles east of the Coats pool.

Parker Drilling Co. has the contract and was moving in derrick for the L. C. Hay and F. G. Bell 1 Roark, in CSL SE SE 10-20-35w, Scott County, Kansas. This test is an offset to production in the Shallow Water pool, discovered by Atlantic Refining Co. in 1935.

Hessum Drilling Co. has the drilling contract on the Deep Rock Oil Corp. 1 Miller, in NE NW SW 26-18-2w, McPherson County, Kansas. This is a wildcat location 2 miles northwest of the new Derby pool.

Several drilling contractors are scheduled to move in drilling units to the West Edmond field in Oklahoma when they are available. These include **Jennings Drilling Co., Jack Grace** and **D. C. Norwood,** all of Wichita Falls; **Falcon-Seaboard Drilling Co.** and **Beacon Drilling Co.** of Tulsa, and **Lupher Drilling Co.** of Reed City, Mich. There are 59 firms or contractors already at West Edmond.

The entrance of additional drilling contractors into Elk Hills has permitted an increase in the scope of work. At present the following drilling contractors are engaged in drilling at Elk Hills: **Bender Drilling Co.; B. M. F. Drilling Co.; Howard Drilling Co.; Stansbury & Stansbury; George Terry; Buaas Drilling Co.; Hoover Drilling Co.; Tracy Harkness,** and **Burton & Burton Drilling Co.**

Bell & Loffland has completed a contract well for Standard Oil Co. of California in the Rio Vista gas field this week and a commercial gas well. **Brown Drilling Co.** successfully completed Standard Oil Co. of California 6-H Perry Anderson, another large commercial gas well in the same field. The latter well proved up the existence of a new gas zone.

Ray Pearson, formerly with Gulf Oil Corp., Tulsa, as field auditor, has resigned to accept a position with **Bert Miller Drilling Co.,** now operating in the Illinois area.

Sam Jewell has the drilling contract on the Davon Oil Co. 1 Hopkins, for which derrick was being built in C NW SE 3-17n-4w, in the Layton sand zone of Crescent field, western Logan County, Oklahoma. Same operator was moving in tools for the 1 Millette, in C NW NE 22-17n-4w, Logan County, with **Gillespie & Lobaugh** having drilling contract.

Penrod Drilling Co. has the contract on the Hunt Oil Co. 1 Roberts, wildcat in Webster County, North Louisiana, in 11-23n-10w, 5 miles southeast of Springhill. The test is scheduled for 9,500 ft.

Hollandsworth Drilling Co. Longview, Tex., is contractor on the Ellis County wildcat designated as Lasco 1 R. S. LeSage. Now past 1,000 ft., the well is contracted to 4,000 ft., and may be carried deeper.

Mercury Drilling Co. has accepted contract from Sohio Petroleum Co. for its 1 Guy Casey well in NW SW 9-14n-4w, West Edmond field, Oklahoma. The company is now drilling a well for Phillips Petroleum Co. on the Wheatley ranch in Barber County, Kansas, one for Deep Rock Oil Corp. on the Skinner ranch in Barber County, and one for Texas Co. in the Pritchard field, Barton County, Kansas.

Drilling Association to Meet

The fourth annual meeting of the American Association of Oilwell Drilling Contractors will be held in Fort Worth, October 3 and 4, with headquarters at the Blackstone Hotel. A program is being arranged which will permit of both formal and informal sessions, and which will permit the contractors to gain intimate knowledge of the drilling situation from both national and local viewpoints.

LA.-ARK.

Haynesville Extension Gets Two Completions

SHREVEPORT.—Two completions in the Haynesville Extension pool in Arkansas, rated at 375 and 300 bbl., were the best of the week in this area. Arkansas operators completed three oil producers and two dry holes, while northern Louisiana operators reported four oil producers and four gas wells.

Mid-States Oil and Sohio Petroleum Co. 1 George, 1,056 ft. north and 1,874 ft. west of the southeast corner of 34-19s-20w, good for 375 bbl. from the Pettit pay at 5,535-49 ft., and Mid-States 1 Taylor Stevens, 913 ft. north and 660 ft. east of the southwest corner of NE 4-20s-20w, rated at 300 bbl. from Pettit pay zones at 5,474-88 ft., and 5,530-45 ft., were the Haynesville Extension completions. The other oil producer in Arkansas was a 168-bbl. well in the Paluxy pay in the Fouke pool by Carter Oil Co.

Louisiana operators completed two gas wells in the Monroe field, one in the Caddo field, and Sohio Petroleum got a 10,000,000 cu. ft. gas well in its 1 Parker, NE SE NE 6-13n-13w, Holly pool, from pay at 2,882-85 ft. Three small oil wells were completed in the Caddo field from shallow pays and Triangle Drilling 2 Frierson Co., SW SE NE 33-14n-13w, Holly pool, was rated at 82 bbl. from pay at 2,790-95 ft.

ARKANSAS WILDCAT COMPLETIONS

Calhoun County: Skelly 1 Gaughan, approx. NW NW 3-14s-16w, dry, TD 3,683 ft.

Union County: Kerlyn Oil 1-A U. S. M., SE SE SE 20-18s-13w, dry, TD 4,350 ft.

NO DANGER—
When Bearings Are Poured With BABBITRITE

Babbitrite never "blows out" because it contains no moisture to generate steam, and does not melt even at high temperatures. Babbitrite "sticks tight" to mold or metal under all working conditions—has strength of body to hold a charge of molten babbitt.

Ask your Oil Well Supply Store about this SAFE Babbitt Retainer, or Write for Liberal Sample.

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PRODUCTS MFG. CO.
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A 4427-1/6

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(TRADE MARK REGISTERED U. S. PATENT OFFICE)
THE ONE BOLT COUPLING

PARTS ARE FREELY
Interchangeable
★
THORNHILL-CRAVER CO. • HOUSTON

OHIO, KENTUCKY

Summit Wildcat Test Opens New Gas Pool

COLUMBUS.—J. C. Steiner hit 260,000 cu. ft. of gas in the Newburg sand in a wildcat test on D. B. Anderson fee, Lot 22, Norton Township, Summit County. The well was shot and shut in at 586,000 cu. ft.

Two wells were completed in the West Zanesville pool in Falls Township, Muskingum County. Brendel Oil Co. 1 McIntire gaged 2,556,000 cu. ft. in Clinton at 3,520-65 ft., and Ohio Fuel Gas Co. 1 E. E. Walker gaged 1,243,000 cu. ft. in sand at 3,521-72 ft.

The Bloom pool, Morgan County, was extended west by two gas completions. Industrial Gas Co. 1 Robinson-Huffman, Section 9, gaged 789,000 cu. ft. in Clinton at 4,383-4,407 ft. and H. K. Porter Co., Inc., 1 Lyle Carpenter gaged 800,000 cu. ft. in sand at 4,357-85 ft.

OHIO WILDCAT COMPLETIONS

Morgan County, Bloom Township: Palm Oil 1 Wilkes Richardson, Sec. 11, Clinton 4,600-35 ft., Medina 4,714-26 ft., dry, TD 4,727 ft.

Perry County, Bearfield Township: Northern Ordnance 1-C J. R. Longstreth, Sec. 1, Clinton 3,939-83 ft., Medina 4,038-46 ft., dry, TD 4,057 ft.

Summit County, Norton Township: J. C. Steiner 1 D. B. Anderson, Lot 22, Newburg 3,386-91 ft., 586,000 cu. ft. gas, TD 3,400 ft.

WESTERN KENTUCKY WILDCAT COMPLETIONS

Butler County: Clarence Juist 1 Forgy, SE NE SW 5-G-33, dry at 680 ft., Vienna 33 ft., Aux Vases 495 ft., Ste. Genevieve 505 ft., McClosky 635-70 ft.

Carter Oil 1 Herald, SE cor. SE SW 16-J-33, dry at 1,909 ft., Menard 1,060 ft., McClosky 1,743-1,846 ft., at intervals.

Henderson County: George Schoonmaker 1 B. F. Denton, S½ SW SW 23-O-23, dry at 2,694 ft., McClosky at 2,622-25 ft.

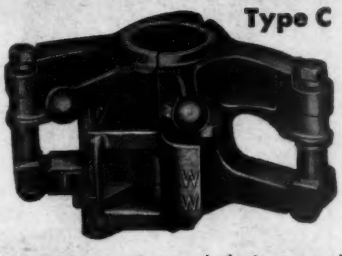
Union County: Gulf 1 Rankin, 16-Q-20, 6 mi. NE of Uniontown, pumped 84 bbl., TD 1,824 ft.

INDIANA WILDCAT COMPLETIONS

Wells County: Texas Co. 1 James, SW SW NE 19-27n-13e, dry at 1,185 ft., Trenton lime at 1,136 ft.

Texas Co. 1 LeSprehleger, NE SE SW 31-27n-13e, dry at 1,283 ft., Trenton lime at 1,135 ft.

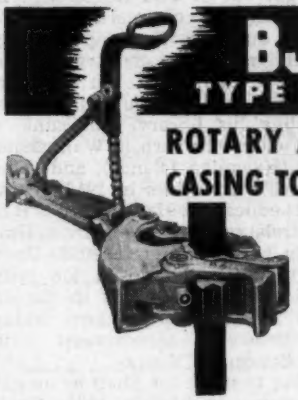
WEB WILSON
Elevators



Automatic opening and closing speeds up round-trip time. Self-locking latch freezes latch in closed position when under stress. Light weight with great strength. Regular and upset types for either drill pipe or tubing.

SEE COMPOSITE CATALOG—
PAGES 3101 to 3120

WEB WILSON
Oil Tools
W. W. WILSON BUILDING
HUNTINGTON PARK, CALIF.



BJ
TYPE "C"
ROTARY AND CASING TONGS

Designed for portable drilling rigs, workovers and for handling small sizes of drill pipe on the largest rigs, this tong has proven most popular and successful. All diameters from 2⅜" to 8⅝" are perfectly gripped by using proper size latch lug jaws. Tong can be equipped with either short or standard levers, dependent on derrick conditions. Hinge pin holes are flame hardened to insure long trouble-free life. This tong, like the BJ type "B," is designed to meet unusually tough service conditions.

BYRON JACKSON CO.
Houston • LOS ANGELES • New York

PERSONALS

Chalmers Left The Hague Just In Time

JOE CHALMERS, whose promotion to acting assistant production manager in the Gulf Coast area has been announced by Shell Oil Co., Inc., got out of The Hague just in time to avoid being marooned there for the duration. The ship carrying him arrived in this country without serious incident, but the one carrying the family's household goods, including his library, was sunk.

Chalmers was born in Waimanalo, Oahu (Hawaiian Islands), and came to the United States in 1918 to finish his education. He received a B.S. in petroleum engineering from University of California in 1922. Upon his graduation he got a job with Pacific Oil Co., working in the oil fields several years before taking a civil-service appointment with U. S. Bureau of Mines.

Going to work for Shell as an exploitation engineer in 1933, Chalmers was assigned first to Iowa, La., and then to Wink and Kilgore, to become familiar with production and engineering methods in those divisions. He spent a year as division superintendent in Kilgore. Three years on assignment at The Hague followed, and he was exploitation engineer in Houston when his latest promotion was announced.

J. W. Connolly, manager of fuel oil sales, Esso Marketers, is chairman of the subcommittee on fuel-oil conservation, which will serve as liaison between the oil industry, Petroleum Administration for War and Office of Price Administration, in a campaign designed to present the true fuel-oil situation to distributors and their employes. Other members of the committee are: **Wesley I. Nunn,** Standard Oil Co. of Indiana; **John W. Scott,** of Buckley & Scott Utilities, Inc.; **Frank E. Spencer,** Socony-Vacuum Oil Co. and **Douglas W. Smith,** Standard Oil Co. California.

Ray Vernon Hennen, Miami, Fla., geologist for the Benedum-Trees interests, and **Mrs. Jane E. Smith,** Houston, were married July 12 in White Temple Methodist Church, Miami. Hennen was chief geologist for the old Transcontinental Oil Co. At present he is doing exploratory work in the Southeast for Benedum-Trees.

David R. Williams, vice president of Williams Brothers Corp., pipeline contracting organization of Tulsa, suffered serious chest injuries in an automobile accident while on a construction job at an undisclosed place outside the United States. He is in a hospital, receiving excellent medical care, and his condition was reported as "not critical."

Gage Lund, president The California Co. (subsidiary of Standard Oil Co. of California), and **Harold C. Teasdel** and **K. H. Crandall,** vice

TEASDEL LUND CRANDALL

presidents, recently completed a tour of the company's properties in Louisiana.

Francis C. Horner, Sr., has been transferred from the Luling, Tex., district to the Colorado district, Randado, Tex., as district superintendent by Humble Oil & Refining Co. **Charles T. Miers** has been transferred from the Maurbro district, Lolita, Tex., to the Imogene district, Pleasanton, Tex., as district superintendent. **Baker B. Ingram,** district petroleum engineer, has been transferred from the Sand Hills district, Crane, Tex., to the Hurdle district, McCamey, Tex. **Antum E. Cuthrell,** district petroleum engineer, has been transferred from the Flour Bluff district, Corpus Christi, to the Imogene district. **Bynum B. Moller** has been reemployed as district petroleum engineer in the Thompsons, Tex., district. **Thomas M. Roper** has been transferred from the Louisiana division office, New Orleans, to the Bayou Sale district, Franklin, La., as district chief clerk.

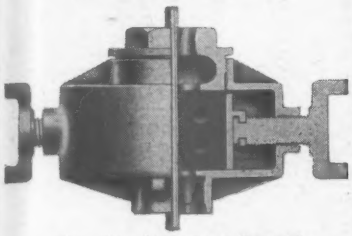
Dr. G. S. Dille, Tulsa, has been made manager of the land and geological department of Deep Rock Oil Corp., and will assume his new post September 1. Doctor Dille, graduate of State University of Iowa, where in 1929 he received his doctorate, was professor of geology at Coe College for 6 years. He then joined The Texas Co., remaining with that organization till 1936, when he resigned to become a consultant. He is a past president of Tulsa Geological Society.

T. E. Swigart, president Shell Pipe Line Corp., Houston, is general chairman of the Harris County War Chest fall campaign. **Claude B. Hamill,** independent oil operator of Houston, has been named chairman of the big-gifts division.

J. A. Heeren, for the past 10 years an engineer for Stanolind Oil & Gas Co., has been appointed associate professor of petroleum production in the University of Tulsa college of engineering. Heeren has 15 years' experience in the oil industry, first with the Midwest Refining Co. and later with Stanolind. He graduated from Colorado School of Mines in 1934 with a degree in petroleum engineering.

Say "DOUBLE E"
WHEN YOU WANT .... The Best

SUCKER ROD STRIPPER



The "Double E" Adjustable Sucker Rod Stripper is the most economical and practical tool of its type. It not only does an excellent job of cleaning oil and paraffin from sucker rods as they are being pulled, but it has the very fine advantage of having retractable rubbers which can be withdrawn into the housing when not needed for stripping. This permits a long rubber life and also permits adjusting the rubbers against the rods to compensate for normal wear. The packing elements are of soft rubber (two halves) and readily accommodate any size rod or coupling. An examination of the cut shows how the packing is screwed against or backed away from the rods.

"DOUBLE E" Products
EQUIPMENT ENGINEERS
INCORPORATED
2039 AMELIA STREET
DALLAS 9, TEXAS

MARKET QUOTATIONS

Prices as of August 22, 1944

(This service is abbreviated because most refinery products are selling at the Government's price ceilings. Quotations on other products than those shown here furnished on request. Quotations are f.o.b. plant in tank cars and in cents per gallon.)

REFINERY GASOLINE

Octane (A.S.T.M.):	80†	70-74
Mid-Continent*	6.00-6.25	5.875
Gulf Coast	6.00-6.50	‡5.750-6.125
Northeast Coast	9.80	9.075
California		6.255-9.375

*Basis Oklahoma Group 3. †1939 C.F.R. (research method.) ‡Unleaded.

NATURAL GASOLINE

Grades:	25-70	18-55
Oklahoma (Group 3)	4.750	5.700
North Texas	4.375	5.250
North Louisiana	4.375	5.250
California	4.675	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl.	
East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas	1.08

Note: Exclusive of subsidy.

A.P.I. REFINERY REPORT

Week ended August 12, 1944

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	164	3,671	471	772
Ind., Ill., Ky.	783	17,493	4,254	6,247
Okla., Kan., Mo.	377	6,869	1,454	1,799
Censored area*	2,346	37,187	17,237	20,920
Rockies	115	2,234	661	356
California	775	13,749	32,926	9,941
Total 8-12-44	4,560	81,203	57,003	40,035
Total 8- 5-44	4,529	80,801	58,572†	39,410
Total 8-14-43	4,050	71,248	66,644	34,768

*Reports combined on East Texas Coast, Texas Gulf Coast, Louisiana-Arkansas and Inland Texas at request of PAW. †Revised.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl.
August 12, 1944	223,597,000
August 5, 1944	222,931,000
August 14, 1943	236,520,000

*Excludes unrefinable California stocks.

CALENDAR

September

A.C.S., 1944 fall meeting, Pennsylvania Hotel, New York, September 11-15.

N.P.A., annual meeting, Hotel Claridge, Atlantic City, N. J., September 20, 21, 22

October

American Association of Oilwell Drilling Contractors, Blackstone Hotel, Fort Worth, October 3-4.

I.P.A.A. board of directors, Dallas, Tex., October 9-11. (Takes place of anniversary meeting previously scheduled.)

C.N.G.A., annual meeting, Biltmore Hotel, Los Angeles, October 13.

November

A.C.S., third national chemical exposition, Coliseum, Chicago, November 15 to 19.

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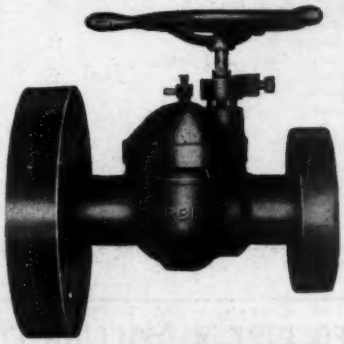
UNEQUAL
FLANGES

The ORBIT GEAR OPERATED MASTER VALVE makes your Christmas Tree more compact by eliminating the use of an adapter flange—also eliminating chances for additional gasket leaks. The Unequal Flanges are cast integral with the body of the Valve.



Orbit Gear Operated Master Valve

This valve can be furnished thru all fabricators of Xmas Trees or thru any of your local supply stores at a price comparable to that of leading plug valves, YET, this valve requires no lubrication to effect a seal.

See Pages 2194 to 2111 in 1944 Composite Catalog

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OIL WELL IMPROVEMENTS CO.
Since 1912
TULSA, OKLAHOMA
E. F. GAHAN, Export Rep.
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New York 18, New York

Summary of July Completions

	Total comp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500	2,500-5,000	5,000-10,000	Over 10,000	Total footage	Rigs and drlg.
N. Y., Penna., W. Va.	†619	231	380	147	†241	47	447	125	...	...	954,605	504
Ohio	111	20	323	45	46	13	29	69	0	0	297,471	199
Indiana	19	10	582	0	9	5	10	4	0	0	32,873	52
Kentucky	67	31	5,399	12	24	9	52	6	0	0	125,420	180
Michigan	52	13	2,589	4	35	3	26	23	0	0	122,630	143
Illinois	171	103	11,047	0	68	3	40	128	0	0	456,423	251
Kansas	141	71	57,625	3	67	0	13	127	1	0	48,433	297
Missouri, Iowa, Nebraska	5	2	66	0	3	1	3	1	0	0	8,779	9
Oklahoma	155	81	27,127	12	62	7	50	69	29	0	528,651	486
Texas:												
North Texas	106	73	16,243	0	33	12	37	31	26	0	346,049	147
West Central Texas	43	25	11,132	0	18	1	14	27	1	0	109,130	53
West Texas	91	80	39,191	1	10	0	3	47	40	1	441,696	451
Texas Panhandle	29	24	3,325	2	3	0	0	28	1	0	92,006	122
Eastern Texas	34	14	5,043	2	18	0	1	8	24	1	203,503	83
Upper Gulf Coast	54	27	7,097	2	25	0	0	4	43	7	411,087	95
Lower Gulf Coast	61	28	4,335	0	24	0	0	7	53	1	391,336	96
South Central, San Antonio	6	2	136	0	4	1	2	3	0	0	16,926	14
South Texas, Laredo	29	13	1,116	2	14	0	7	9	13	0	133,171	52
Total Texas	453	286	87,618	18	149	14	64	164	201	10	2,143,904	1,113
Louisiana:												
North Louisiana	26	7	1,342	7	12	1	10	5	9	1	115,451	75
South Louisiana	39	28	4,887	0	11	0	0	1	24	14	341,475	91
Total Louisiana	65	35	6,229	7	23	1	10	6	33	15	456,926	166
Arkansas	21	12	3,345	1	8	0	3	7	11	0	108,530	40
Mississippi	17	7	3,437	0	10	0	2	1	13	1	100,697	57
Alabama, Georgia, Florida	1	1	40	0	0	0	0	0	1	0	5,317	17
Montana	35	18	1,638	5	12	2	23	6	4	0	83,198	125
Wyoming	15	12	7,791	0	3	0	0	13	2	0	68,543	99
Colorado	3	3	701	0	0	0	0	0	3	0	18,231	30
New Mexico	23	19	4,046	1	2	1	3	17	1	0	72,109	108
California	190	144	38,895	4	42	5	55	75	40	15	824,776	224
Total July	2,162	1,099	258,868	259	804	111	830	841	339	41	6,457,516	4,100
Total June	2,345	1,177	243,183	323	‡845	75	776	845	400	49	7,511,320	4,074

*Four weeks ending July 29, 1944. †Includes 201 service wells. ‡Includes 175 service wells.

USED PIPE & DRILLING EQUIPMENT FOR SALE

1—Allis-Chalmers, model E, tubing & rod machine, completely overhauled, 4 excellent rubber tires, with large single drum.
1—1 set rubber rig-o-lite, excellent condition.
1—complete Wax. power rig, less drill pipe, for 4000 ft. drilling, good running condition. — We will be glad to send an inventory. Swivels from 300 ton to 50 ton, overhauled and ready for service, Ideal and Emsco.
Large stock of power pumps, oilbath rotaries, crown blocks and traveling blocks.
1—33' x 6¼" drill collar, streamlined, 5-9/16" boxes, prewar.
60—4½" Hughes Acme regular tool joints, worn very little.
15—3½" New Hughes streamlined joints.
1—Climax, 125 H.P., 6 cylinder, gasoline engine, dual ignition.
1—8 K.W. portable rig light plant, unitized with X.A.H. Wax. motor, completely overhauled, ready for service.
2—108 H.P., 275 W.P. Lucey boilers, pass inspection, ready for service.
Large stock blowout preventers, any size, Regan, Cameron, and Shaffer.
Large stock shale shakers, Link Belt, W.K.M. and Symons.

NEW PIPE

7,300 ft. *New* 7" 26# Range II Seamless T & C — No priority.
1,000 ft. New 2⅛" 6.20# Eue tubing Range II Seamless T & C. No priority.

#1 USED PIPE

60,000 ft. 6⅝" (6" line pipe) 19# T & C Range I.
20,000 ft. 5" O.D. 17# T &C Range I line pipe.
100,000 ft. 2" plain tubing T & C 4.50#, make excellent line pipe—2,500# test.

SUCKER RODS

300,000 ft. ⅞" pin & box A.P.I. sucker rods, excellent condition.
200,000 ft. ⅞" pull rods, excellent for construction steel.

PRODUCTION POWERS

Sargain Price

5—Bandwheel powers complete with engine and bull wheel, compressor, circulating tanks, light plant and belting. Suitable for pulling 30 wells—excellent condition—will sell cheap.

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The largest dealers in reconditioned drilling equipment and pipe in the Mid-Continent area

Wire or phone 619 or 620 for quotations — We ship anywhere

For Combating **Hydrogen-Sulfide Corrosion Salt Brine Scale and Electrolysis**

USE—Hydrogen-Sulfide Neutralizer through casing in oil wells to prevent embrittlement of rods and pitted tubing due to sulphur . . .

and . . .

in gas scrubbers to protect gas engines and camp houses.

USE—NaCl Inhibitor through casing in oil wells to protect casing, tubing, rods and lines from pitting due to electrolysis.

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CHEMICAL NEUTRALIZERS

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